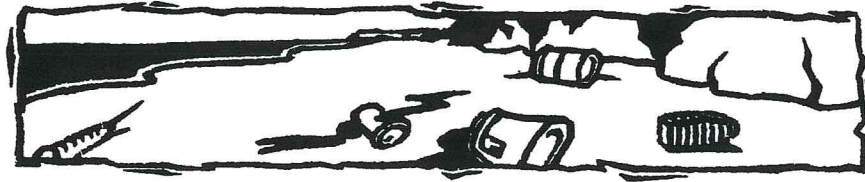
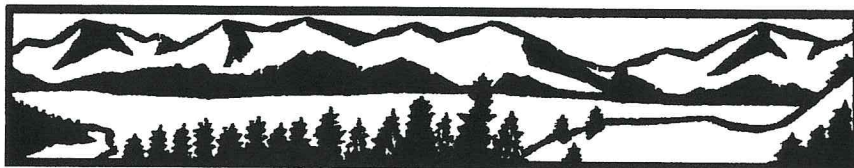


Pollution Solutions:



Litter Prevention Activities for Virginia Teachers

A curriculum supplement about litter and pollution prevention
based on the Standards of Learning for grades K - 12



Developed by the Virginia Resource-Use Education Council
and funded by the Litter Control and Recycling Fund

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With funding from the Virginia Litter Control and Recycling Fund, the Environmental Education Leadership Project had a dream--to write a litter prevention curriculum. The lessons would correlate with the current Virginia Standards of Learning and be able to be used for classroom presentations by the various local Litter Prevention and Recycling Program Managers around the state. Under a limited budget, a team of some of the most talented and dedicated educators in Virginia was asked to do the impossible-- put together activity ideas and frameworks in one and a half days! They not only met the task, but exceeded all expectations!

Attendees at the 1997 Litter Prevention Writing Workshop:

Diane Barns; Beverly Broadfield; Babs Cohen; Jim Firebaugh; Judy Ann Fray; Wana Gillies; Jennifer Hindman; Liz Kleese; Dawn Lerch; Tom Mack; Kimberly McArter; Clara Mills; Barbara Reese; Ann Regn; Ginger Richards; Amy Robelen; Yvette Robinson; Angela Seiders; Mary Spruill; and Diana Vann. Angela Higgs was Project Coordinator.



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Henry Heron, A Litter Story

Target Level:

Kindergarten and Grade 1

SOLs:

Science: K.1, K.6, K.10, 1.1, 1.8

English: K.1, K.8, K.11, 1.1, 1.12

Social Studies: K.7

Materials Needed:

Henry Heron story copy

Plastic six-pack ring

Rubber bands

Optional: picture of a heron or stuffed animal

Time Needed:

One class period

Summary

Students will listen to a short story, sequence an order of events, and predict a conclusion.

Objectives

Students will be able to recognize litter and be able to explain how it may affect animals. They will also be able to identify ways to reduce and prevent littering.

Background

Animals need food, water, air, and space. The water and the space must be clean and free of litter to provide a safe and healthy habitat. See *Quick and Dirty Fact Sheet: Litter* or visit the web site, www.deq.state.va.us/kids/kids.html.

Procedure

1. Ask for a show of hands of students who have recently visited a park with a lake. Discuss the things they saw around the lake and guide the discussion toward litter or trash they might have seen. Emphasize the animals they saw and explain that litter may hurt the animals. If you brought a visual, share it with them. Point out that the heron is a large bird with long legs and neck, and it eats fish in the water. Introduce any new vocabulary words in *Henry Heron* story before you read it to them.

2. Read *Henry Heron* and stop in the middle to have students predict what will happen to Henry. After finishing the story, discuss how Henry might have felt and how the people helping Henry might have felt.

3. Show a six-pack ring and pass it around so students can see how strong it is.

4. Take a large rubber band and fasten it over your thumb and little finger (over the back of your hand). Ask the students if they think it would be easy to remove the rubber band without using their other hand. Let several or all of the students try. Have them discuss how hard it is to remove the rubber band. Talk about how animals have trouble removing items that get caught around their feet and necks since they don't have hands and fingers to help them.

Note: Some people recommend cutting rings before disposing of them because years ago some garbage was dumped at sea. In Virginia trash is recycled, landfilled, or incinerated. If rings are recycled or disposed properly, cutting them is not necessary (unless you are on a ship out at sea which may dump its garbage in the ocean).

Wrap Up/Assessment

1. Have students suggest their own ending (what might have happened differently?) or have students retell the major events of the story. Depending upon the level of the students, this might be accomplished verbally, through illustrations, or in writing.

2. Ask students the following questions:

What are other examples of litter that might be found around the lake? How might these things be dangerous to animals? What can you do to lessen the amount of litter?

Henry Heron

Henry is a heron. He likes to hang out at the park's lake. He often stands as still as a statue and waits for minnows to swim by so he can grab a quick snack.

Henry is a very curious heron and always explores the nooks and crannies of the lakes and rivers he visits. One day Henry saw something stuck in the grass near the edge of the lake. "I wonder what that could be?," he thought excitedly as he went closer. "Oh, it's only a soda can," he sighed. "Another piece of trash left by a lazy person. I don't know why people can't be neater!!"

Just as he was about to wade away, Henry saw a minnow skimming through the water. He did exactly what comes naturally to herons. His head went down and he came up with the minnow in his beak. "Yum!," he said as he swallowed the minnow. "I love good food."

Then Henry noticed he had caught more than just the minnow. The minnow had gone beneath a plastic six-pack ring and as Henry had reached to get it, his head had gone through the ring. It was stuck on his long neck!

Henry shook, he wiggled, he rubbed against the grass, he stuck his head into the water ... but nothing he did would remove the plastic ring. "This is terrible, horrible and awful," Henry announced to the world. But no one was listening. Henry gave one more long, lonely shake of his head.

Morning dawned and Henry stretched, but was brought up short. The plastic ring pulled and squeezed his neck, and made it very hard for Henry to breathe. Then some park visitors saw Henry. They chased him, trying to catch him. We know they just wanted to help Henry, but all Henry knew was that he was scared and wanted to get away. He wished he could disappear. He flew away and landed in a nearby clearing.

After a while Henry got hungry and came out to the middle of the lake. He tried to catch some fish but the plastic ring kept getting in the way or it moved, and scared the minnows away. How could he catch some fish? Henry flew to the shore, still hungry. When he got there he was again chased by people. This time, the people were in uniforms.

The next day Henry was tired, hungry, and terribly discouraged. He went over to the other herons. They also chased him away. "You're scaring all the fish away." "You're making people chase us." "You look stupid with that plastic ring thing around your neck!"

"I didn't get it stuck on myself on purpose," Henry said. "I tried to get it off." But the herons just flapped their long wings and left Henry. One of them even pecked at Henry, and you know that had to hurt!

Teacher note:

Stop here. Ask the students to predict what they think might happen to Henry.

Henry was resting quietly in a cove of reeds when suddenly he was covered with a net. He flapped and struggled but he couldn't get away. When hands reached for him, he snapped at them with his beak. The people wouldn't give up. They finally got a good hold on Henry and tried to calm him. They held his neck very still and clipped the plastic ring and then pulled it off. When they released Henry he flapped his wings and flew across the lake. Once he had calmed down, he realized the people had helped him and had removed the plastic ring.

"Yes," he said. "I can eat again! I can drink!" and he dipped his head into the water. "I can sleep and eat and do almost anything!!!" Henry was so excited!



Note to teachers and older students:

It would be nice to say Henry was safe for the rest of his life. Many animals never get rescued in the first place and those that do may get caught in litter again. Animals do not remember what has happened to them in the past like people do. Animals would probably not realize that litter is dangerous to them either. They may even think a piece of litter looks like something interesting to eat and go after it on purpose. We can help by always putting our trash in the right places.

The Is-It-Litter? Box

**Target Level:**

Kindergarten and Grade 1

SOLs:

Science: K.1, K.2, 1.1, 1.8

English: K.2, 1.1

Materials Needed:

A covered box containing natural and man-made (clean litter) items.

Note: there should be at least one item of each for each student.

Paper and crayons

Time Needed:

30-45 minutes

Summary

Students will use their senses of sight and touch to identify and respond to information about their surroundings. They will also increase their vocabulary skills and draw a picture as they relate their observations.

Objectives

Students will be able to differentiate between items that are natural and those that are man-made. They will also understand that trash “out of place” (such as on roadsides or on the playground) is litter.

Background

Natural items might be thought of as those objects that are “made by nature.” Man-made items refer to objects that are “made by man or by machine.” Those objects found in inappropriate places should be considered litter. If people use a proper waste container or recycling bin, instead of dropping or throwing items just anywhere, less litter and pollution would be generated. For young students, litter is a good example of pollution. (Pollution: things, often by-products of production, that are harmful to our health and to the environment.) Less litter and pollution would make communities more attractive and healthier places in which to live.

Procedure

1. Lay all of the items on a table. Explain to the students that there are both “natural” and “man-made” items included. Holding up a natural object, ask the students if they think it was made by nature or by people. After a short discussion, repeat the question while holding up a man-made object. Summarize/establish a working definition for both of the words “natural” and “man-made.”
2. Have students think about being outside on the playground (or a place they are all familiar with). Pick two or three man-made objects from the table. Ask students if they would think the playground was littered if they were to see these man-made items laying around. Discussion questions might include: Why? Would they be out of place? Is this pollution? Where should those items be placed so they are no longer littering the playground? What are some ways each of them can prevent pollution? Can any of the items be recycled? Are there recycling cans or bins in the school? Where are they?
3. Put the man-made items on the floor. Ask the students to imagine they are eating lunch and see these items on the floor. Add a few natural items from the table to the floor. Determine whether these items should also be removed from the floor and where they might be placed. Help students conclude that trash out of place becomes litter.
4. Put all of the items in the box and let students know they will play a game that will be very tricky so they should listen carefully. Explain that they will now pretend that all of the items in the box are laying along the side of a road. They will be able to pull out two objects - one that is natural and one that is man-made. But, the tricky part will be that they cannot use their eyes to see in the box to help them decide which items to pick up! Instead, they will carefully use their fingers to feel what the items are.
5. Give each student the opportunity to close their eyes and pull both a natural and a man-made object out of the box. Each student should explain which object might be naturally found on the side of the road and which might be considered litter. Have the students draw a picture of themselves throwing their litter into a trash can or recycling bin. The students should take their pictures home to help them remember what they learned about where their litter should be placed.

Note: If the help of an assistant is available, the majority of the students can get started on their drawings while a few are pulling from the box. The students should finish their drawings after they know what pieces of litter they have picked out of the box.

A Beautiful Day

Target Level:

Grade 2

SOLs:

Science: 2.1, 2.8

English: 2.2, 2.3, 2.8

Materials Needed:

Art supplies

Optional: relaxing tape of forest or stream environment sounds

Time Needed:

One class period

Optional: lunch period

Summary

Students will listen to a story and illustrate what they have experienced through guided imagery.

Objectives

Students will be able to recognize some of the intrinsic values of litter-free woods and streams.

Background

This activity is designed to assist students in visualizing the differences in an area when it is clean and when it is littered. The instructional technique of visualization, or guided imagery, allows students to conjure in their minds the images you are suggesting. The concept of interdependence of living and nonliving things are introduced and explored, and conclusions are drawn based on the students' experienced observations and feelings regarding those images. This activity could be combined with a field trip to a local park or a picnic outside on the school grounds.

Preparation

If planning to take the students outside for a lunch and cleanup activity after this exercise, remind them to bring a bag lunch or snack ahead of time.

Procedure

1. Tell the students they are going to take a trip in their minds and will need to use their imaginations. Have them sit or lie comfortably and close their eyes. They should listen carefully and picture what you are saying as you take them on a picnic at the edge of a stream.

2. Read the following short story:

You and your classmates are sitting in the shade of some trees next to a stream. You are talking with your friends and enjoying some of your favorite foods. Now the meal is over. You and your friends carefully place your garbage, cups, glass, plastic bags, and paper back in your lunch bags. You want to leave this place as clean and neat as it was when you arrived here.

Now you are heading out for a short nature hike. You are walking along the bubbling stream. You hear the water rushing over the rocks, swirling around, and lapping gently against the little sandbar nearby. The sun is warm on your back. The wind is blowing softly on your face. You see ferns and grasses growing along the stream banks. The leaves on the trees are moving gently. You see a raccoon's tracks on the bank and stop to look at them. You hear the call of a bird and wonder if it is letting its friends know that you and your friends are coming close by.

As you and your friends continue to walk along, you begin to notice other things too. You see some old soda cans and broken bottles. And there are cigarette butts laying all around. There is a torn garbage bag and its trash is spilling out. In the bushes you see an old tire. It is almost hidden with grass and briars growing around and through it. There are old oil cans too. They seem to have been just thrown there. You continue to see pieces of cardboard and paper and plastic wrappers. One of your friends points out a large bird standing in the water ahead. It is a heron. Its large wings flap and lift it away. You are still thinking about all the litter you keep seeing. You feel sad and wish that it wasn't there.

One of your group leaders says it is time to head back and hands you a trash bag. You and your friends make a game out of picking up the litter you see. You stuff papers into the bag

and plastic bottles. Your leader says to let her pick up the broken glass and she puts on her heavy work gloves and puts the pieces in her bag. As you walk, you continue to put pieces of litter in your bag. The bag is getting heavy and one of your friends takes it for a while. Someone tells you to look up and see a cloud that looks like a beetle. You see a cloud in the shape of a rabbit too. You pick up more litter. Your leader says you are helping to make this area a safer place for the animals that live in the stream and along the bank. You know you are helping to make the trail a more beautiful place to visit too. You are soon back to your picnic area. That was a fun hike!

3. Have the students slowly open their eyes. They should stay quiet for a few minutes and think about their picnic and hike. Tell them to remember the things that made them smile.

4. Ask students how they “felt” when they were (walking, talking, and picking up litter) on the way back from their imagined hike? Generate additional discussion with the following questions:

Why is broken glass dangerous? Note: Be sure to emphasize the need for precautions (e.g., heavy gloves, broom and dustpan, etc.) around broken glass, anything that looks like medical equipment, or any other items one may not be familiar with. Explain that it is always best to have an adult pick up these kinds of items because they will know more about what specific precautions may be needed.

- . Who usually cleans a park?
- . What might happen if nobody cleaned the park?
- . Have you been to parks that are clean? Ones that are dirty?

Wrap Up/Assessment

1. Have the students verbally generate a list of words describing a park that is clean, and then a second list describing a park that is dirty.
2. Remind the students about their imagined picnic and hike. Let each student draw a picture of what they remember that made them smile.

Extension

Take the students outside for a picnic lunch and clean up afterward.

This activity was adapted from Marine Debris Teaching Activities available from the Center for Marine Education.

How Attractive (Magnetic) is Your Litter?

Target Level:
Grade 2

SOLs:

Science: 2.1, 2.2

Math: 2.2, 2.4

Materials Needed:

Part 1 -

Several (10-15) classroom use magnets.

A collection of common litter items, including ones that are magnetic.

(Suggestions for magnetic items include: both metal and plastic-coated paper clips, a variety of drink container tops or lids, pens with metal clips, screws, push pins, a clean vegetable can, etc.)

Part 2 -

See section for additional materials

Time Needed:

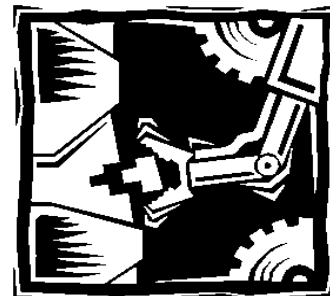
Two class periods to conduct both parts of this activity.

Summary

Students will investigate various types of litter and invent ways to 'pick it up' as they design and construct a simple machine to collect specimens.

Objectives

Students will understand that litter is made of different materials and be able to identify whether the material is magnetic or non-magnetic. They will be able to explain characteristics of a physically constructed model and make judgements about design effectiveness. Students will also be able to analyze the data collected and come to the conclusion that prevention is easier than clean up.



Background

Some types of metal, like gold, silver, brass and copper are so valuable you would never dream of throwing them away. Aluminum and steel, while valuable too, are often thrown away instead of being reused or recycled. Steel is the most recycled material in America. Steel is made from iron ore which is magnetic. Magnetic belts can be used to separate steel cans from other garbage. This method is much more efficient than the labor-intensive hand-sorting necessary with other recyclables. Some communities team up with other localities and send their garbage to a materials recycling facility (MRF) for processing. These plants, MRFs, sort the trash into glass, metal, and other recyclable products. Magnets, sieves, and blowers are used to help separate the trash into separate recycling categories. Steel can be recycled again and again, saving energy and natural resources each time.

Preparation

Copy the "Pick Up Litter" poem/song onto a large sheet of paper or posterboard. Review the concepts of magnets with your students (If you are a guest speaker, confirm that magnets and magnetic qualities have been introduced-- Science 2.2).

Procedure-- Part 1

1. Ask students for examples of litter. Define litter through discussion and examples (i.e. What causes the students' examples to be considered "litter"?). Bring into the discussion any of the different kinds of litter that you brought, being sure to include those that are magnetic. Guide students toward reaching the conclusion that litter is made of different kinds of materials. Explain that you are going to help them get ready to design a model or a simple machine that will be able to pick up various kinds of litter (Note whether Part 2 is going to be conducted on a different day).
2. Ask students if they know what an "inventor" does and establish a working definition. Tell students they should imagine (pretend) they are inventors of a machine that will pick up litter. What might the machine need? Have students suggest components that might be helpful (e.g.: claws, pinchers, teeth, scoops, hooks, etc.). It may be beneficial to have students relate to other machines, tools, or animals, and how they grasp or transport items.
3. Hold up a magnet and ask the students where they might have seen a magnet before (e.g., on a refrigerator). Ask how magnets are used and if they are useful components in machines. Have students predict what kind of litter a machine made with a magnet might pick up. Bring everyone into a circle or half circle and put your pile of litter in the middle. Ask the students to predict what portion of the entire amount (fraction) of the litter will be magnetic. Record the information for later comparison.
4. Give every two or three students a magnet and let them go as groups to prove which items are magnetic and which are not. Discuss their findings in terms of magnetic and non-magnetic. Some items stick and some do not. What is the difference? What is the natural resource

needed as a component of the litter to make it magnetic? Explain how magnets are used in recycling centers and MRFs (contact your local public service authority about recycling processes in your community.)

5. Read through the words of the poem out loud. Encourage singing it as a song the second time through! It can be sung to the tune of "Frere' Jacques". Hand motions are included for use if desired.

"Pick Up Litter"

Pick up litter,	(bend over and "pick up")
Pick up litter.	(bend over and "pick up")
Does it stick?	(clap hands)
Does it click?	(snap fingers)
We can make a difference,	(point to self)
You will know we got it.	(point away from you)
Litter's gone,	(spread hands flat)
Litter's gone.	(keep hands flat in front of you)

5. Discuss whether litter is a problem in the students' school/community. Where have they seen it? Whose job is it to pick it up? Is this an easy or fun job? Wrap up by challenging students with the task of inventing a litter "pick up" machine. Leave them with enthusiasm that they can be great inventors and will do a good job "picking up" litter!

Part 2- Materials Needed

A resource box of supplies containing magnets and other items which students can use to make a class machine or enough to have several cooperative groups.* Suggestions include a dowel(s), an assortment of duct and scotch tapes, twine/string, scissors, cardboard boxes and an assortment of tubes, heavy paper, plastic cartons, polystyrene foam blocks, etc., plastic forks, clothes pins, toothpicks, big paper clips, straws, craft sticks, glue and/or a glue gun. Two bags for trash the machine(s) has collected; one labeled "magnetic" and the other "non-magnetic."

*Note: More than one class machine might be constructed if additional adult assistance and material is available.

Procedure- Part 2

1. Each student (or pair of students) should choose an item(s) from the resource box and decide how it might fit onto the dowel, making a class machine that will pick up trash. Give students a few minutes to consider its design, purpose, and method of attachment. Some pieces may be purely decorative, and students may wish and agree to join their pieces prior to attaching them to the "class machine." Display and summarize the attributes of the machine, with the students' assistance regarding intended use of the various components.

*Variation: Have each pair of students design individual models/machines that they will take turns operating.

2. Take the class on a predetermined litter tour (to neighboring classrooms, halls, cafeteria after lunch period, school office, etc.). Have students take turns picking up litter with their machine and depositing it into the appropriate bag.

3. Have students count the number of items in each of the bags and record their results on the blackboard.

Data:

How many items were collected?

total	_____
magnetic	_____
non-magnetic	_____

What fraction of the litter is magnetic?

Draw a simple picture graph or bar graph to illustrate the results.

Wrap Up/Assessment

1. Discuss what types of litter were found in different places, and ask students what types of modifications they might recommend for their machine.

2. Have students give examples of magnetic and non-magnetic litter that might be found if they were doing this at home, or at their parents workplace. Would much of the litter be magnetic? How might some of this litter be prevented from occurring (proper disposal, buying items with less packaging, etc.)? Is there an easy way to pick up litter? Would it be easier to prevent litter rather than having to pick it up?

Litter Concerns

Target Level:

Grade 3

SOLs:

Science: 3.1, 3.3, 3.6, 3.10

Materials Needed:

Paper and crayons or markers

Time Needed:

3-5 days

Summary

Students will observe, record and discuss examples of litter. They will also draw a picture, illustrating their main concern and make a presentation to their classmates.

Objectives

Students will be able to develop their own definitions of litter using inquiry-based methods. They will also be able to illustrate and verbally support their conclusions and concerns relating to litter.

Background

Many people, especially children, simply do not “see” litter. By looking for litter and making observations, their awareness and understanding of the problem is increased. Consult *Quick and Dirty Fact Sheet: Litter* or visit DEQ’s web site for students: www.deq.state.va.us/kids (in the E-brary section).

Procedure

1. Ask students to predict two specific places where they might see litter in their community. Collect the predictions and rank them by frequency.
2. Assign the following homework to last at least three days, but no longer than a week. Explain that they should record all the places they see litter on the way to and from school and while going around town with their families and friends. The students should keep a running diary of their sightings. It should include

<i>Example:</i>	<u>Place</u>	<u>Litter</u>
	on the side of the road where I live	2 aluminum soda cans

3. After 2-3 days, start recording their observations on the blackboard or somewhere the whole class can see them. Continue adding observations the full length of the assignment.

Alternative: Make a slide show of travels around the school area to include some of the roads the students travel to school, shopping centers they might go, and other nearby places that have litter. Have the students write the instances of litter they see during the slide show and then write the observations on the blackboard.

4. Discuss the places where most of the litter was seen, making a list of the places. Count the number of times a place was listed and add appropriate numbers by their first mention. Examples: around the curbs on Main Street -14; the parking lot of the grocery store - 9; the road along the football field of the high school - 16, etc. The observations can be graphed by frequency. Note the students’ original predictions and ask how they compare with their actual findings.

5. Have each student or small group of students choose one littered location that they personally are concerned about. They should draw a picture that illustrates the litter issue in that place. Explain to the students that they will present their drawings to the class, telling why it is particularly important and what should be done about it. Note: If you are doing a presentation for a classroom, choose several students to share their drawings.

6. Post the drawings on a class bulletin board after the presentations are made. Have the students write a definition of litter and propose ten ways to prevent littering based on their observations and discussions.

Extensions

Have the students create a public “display” with their drawings and solutions. These might be posted in the local library, a restaurant or grocery store. Students might invite their parents, local supervisors and state legislators to visit their exhibit.



Data Sheet

Place

on the side of River Road where I live

Litter

2 aluminum soda can

Litter-Less Lunch

Target Grade Level:

Grade 3

SOLs:

Science: 3.1

Materials Needed:

A selection of lunch items
(e.g., sandwich, crackers,
cheese, fruits, cookies,
drinks, etc.)

Note: include examples of
both reusable and one-
time-use wrappings and
containers

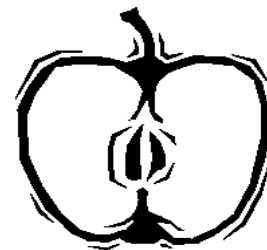
Optional: A nutrition poster
Paper and pencils

Summary

Students will question and discuss the way food is packaged and design a litter-less lunch.

Objectives

Students will investigate and estimate how much packaging--trash-- and possible litter could be in a lunch.

**Background**

Millions of school-aged children across the country carry packed lunches to school. Depending upon how the lunch is packed and what is packed in the lunch, trash is almost always produced. There are some ways to reduce the amount of trash (waste items that will be discarded) in a lunch. The first and easiest change is to pack foods that the child will eat. If you know that your child will not eat the crust of the sandwich, you might want to pack a “crustless” sandwich and compost the bread crusts at home. Another thing is to look at the containers that you pack the lunch in-- will your child return containers or will they be lost at school or on the bus? If you can count on getting the containers back, it is worth the investment to purchase some plastic tubs and a lunch box. If the child has a tendency to lose things, then you may want to try to re-use some margarine tubs or other “recycled” containers.

While all of our food needs some sort of packaging, we can reduce the amount of packaging needed by buying larger containers and dividing into single serving portions and packing the product into smaller reusable containers. Not only will you be saving packaging, you will also save money. If “everyone” at school eats the new pre-packaged lunches that can be bought in the grocery store deli, you may want to make some of your own using crackers, meats, cheeses and re-usable containers. And finally, many food items can be composted; aluminum cans and some plastic containers can be recycled.

Procedure

1. Ask students what they will have (or have had) for lunch that day. Make a list of the items on the board or an overhead. Have students analyze the waste materials left after eating each of the items. Don't forget the “natural packaging” (e.g., banana peels) and the leftovers (e.g., apple cores and crusts of sandwiches).
2. Discuss packaging methods by asking for students' thoughts. Starter questions might include: Why might food need to be “packaged?” What are the advantages and disadvantages of the different kinds of packaging? Can the packaging or containers be reused? Ask students if they ever see any of these items on the floor, tables, or chairs. Establish an understanding about how and when these items become litter.
3. Divide the class into several small teams. Have each team “pack a lunch.” (This might be accomplished by students listing, drawing, or collecting visuals of “lunch materials.”) Explain that each team should also list all items that would be left and thrown away after their lunch is eaten.
4. Allow each group the opportunity to come forward and share their lunch and findings. Note the lack of trash being generated. Ask about and commend groups as they explain how they would prevent their trash from becoming litter! Determine which team had the least amount of trash! Then ask if any teams left any trash laying around to become litter? None!!

Variation for older students

Assign a differently focused lunch to each group. The lunches might include “the Tastiest,” “the Healthiest,” “the Most Packaging,” and “the Least Packaging.” Additional categories can be considered, or assign more than one group to each category. The groups should record their lunches as above and share with the rest of the class. Promote awareness of the lack of trash being generated and discuss how to keep any trash from becoming litter!

Optional Teacher Follow-up

The whole class can participate in a “Litter-Less Lunch Day.” On the designated day each student should carry their lunches to school. As lunch time is finishing, each team should count and record one point for each item that will be thrown away after they are done eating (food scraps become trash). Each team’s record should include the total sum of its members’ trash. It should also be noted: “5 points will be added to any team’s total if there is any trash remaining where it is not supposed to be (litter)!” The team with the least amount of points gets to take a bow!



The Litter-Less Lunch Extension

Students will make a sandwich box, snack box, and lunch bag from items that would otherwise be recycled (like the milk jug) or sent to a landfill (like the ½ gallon juice or milk carton). Denim pants legs are used to make the reusable lunch bag.

The Sandwich Box:

1. Mark a clean 1-gallon milk jug as shown.
2. Cut along the lines with scissors. To make the crease lines, use a thumbtack to pierce a row of dots at ¼ inch intervals across each side of the jug, 1/3/4 inches up from the bottom.
3. Fold the flaps at these dotted lines, then open them and fold them in the opposite direction along the lines (this will make the flaps easier for your kids to open and close). Fold up the box and add an adhesive-backed Velcro dot closure.



The Snack Box:

Use a clean ½ gallon cardboard juice or milk carton. Cut off the top, and then cut the sides into flaps as shown. Carefully crease the flaps, then fold them down and add an adhesive-backed Velcro dot closure. Be sure the flaps are longer than ½ the width of the carton. If the carton is 4" – flaps should be at least 2 ½ inches.



The Lunch Bag:

1. Cut off a good length of the pant leg.
2. Turn it inside out and stitch the bottom closed.
3. To finish the bottom, turn the bag right side out and fold in the corners to make two triangles. Sew those triangles down flat.

The milk jug sandwich container, 1/2 gallon snack holder and lunch bag crafts and photos come from Disney's Family Fun. Here is the link for the sandwich and snack containers: <http://familyfun.go.com/crafts/reusable-lunch-containers-785113/>, and the link to the reusable bag: <http://familyfun.go.com/crafts/crafty-lunch-sack-660656/>

Litter-Quette

Target Level:

Grade 5

SOLs:

Science: 5.1

Language Arts: 5.1

Materials Needed:

Copies of scenario cards

Paper and pencil

Collection of "Ms. Manners"
newspaper columns

Summary

Students discuss consequences and determine appropriate "manners" for several scenarios that involve litter before making oral and written presentations.

Objectives

Students will be able to generate and assess a graph of etiquette related data, assess consequences, and devise recommendations for appropriate behavior.

Background

By definition, "manners" are the prevailing social conditions or customs of society. Or more simply said, manners are the polite, courteous ways people behave. "Etiquette" refers to the manners, and various forms and ceremonies, that are generally established as acceptable or required in social situations.

Practicing good manners in social situations is helpful toward an individual's personal growth and that of society's. Likewise, practicing good "ecological" manners or appropriate "etiquette" related to ecology can be understood to be important to the well being of individual and groups of people, plants, and animals. Good manners show respect.

Procedure

1. Explain that you are going to check out whether the students know their "manners". Ask the students the following two questions to confirm their base knowledge. Record their "yes" or "no" answers in a graph format on the blackboard prior to further discussions of these questions.

a. Last night I went out for pizza with some friends. One of my friends used his or her sleeve to wipe the pizza sauce off his/her face. Was this the right thing to do?

b. Last weekend your family went to your grandparents for dinner. After eating, your sister let out a loud burp. Was this the appropriate thing to do? Note that in some cultures this practice is considered to be a very polite indication that the food was delicious. You might also note that our culture does not feel this way, and most would agree an "excuse me" would be appropriate.

Ask the students if the graphs indicate that the majority of those contributing data are of the same or differing social cultures? Have them discuss why they think manners may be important.

2. Ask students to assess when trash is considered litter. What would the criteria be ?



Have you ever seen trash laying around on the playground (or park or roadside)?
How did it get there?
Have you ever left trash out?
Why are people likely to litter? How can you prevent litter?

3. Divide the class into groups of two or more students each and give each group one of the scenario cards. Give the students 10-15 minutes to discuss the situation and decide how they would act. Have the students share their decisions with the rest of the class.

Wrap Up/Assessment

1. Give each group a copy of a "Ms. Manners" column from the local paper. Have the students read the column and discuss how she gave advice. Then have each group write a Litter-Quette page for their scenario.
2. Brainstorm with the class a list of appropriate and inappropriate litter behaviors in a situation. Have the students discuss other situations where they've observed people littering. (Example: Students trying to throw trash into the trash can from their seats and then not picking up the "misses".) Assign these situations to the groups to write Litter-quette pages. The litter-quette pages can be combined to form a book or write a newspaper to be shared with other classes, the school library, the principal and the PTA.
3. Students can conduct additional research by calculating the "cost" of littering.

Scenario 1

You and several of your friends go to the high school's football game along with your older brother and two of his friends. Your brother goes to the refreshment stand to buy all of you a hot dog and a soda. After everyone finishes eating, one of your brother's friends throws his cup under the bleachers. Should you:

- tell him that littering is bad and he shouldn't do it again
- tell him to pick it up
- tell your brother that you saw his friend litter
- report him to the teacher sitting in front of you
- other

Scenario 2:

You go with your friend's family to a picnic at the local park. After lunch, everyone leaves the paper plates and leftovers on the table and goes for a hike around the lake. When you come back, the wind has blown everything off the table onto the ground. Your friend and his family start packing up the food and extra drinks, leaving the trash on the ground. Should you:

- remind them about the things on the ground
- start picking up the litter and hope that they will help
- ask your friend to help you pick up the litter
- other

Scenario 3:

For your birthday, several friends meet at the movie theater. During the movie you all have popcorn, sodas, candy and other goodies. When the movie is over you notice that all your friends are getting up and leaving their cups, wrappers and etc. laying on the floor near their seats. Do you

- pick up your trash and hope that they follow suit
- say "hey, guys don't forget to clean up after yourselves"
- say nothing but take your trash to a trash can
- leave your trash behind so no-one will say anything to you
- other

Scenario 4:

While shopping at the mall with your family, you notice a group of your friends standing outside of the arcade. They are all eating candy bars and drinking sodas. All around them on the floor are candy wrappers and empty soda cans. Your little sister goes up to them and tells them they are littering and need to pick up their trash. Do you

- pretend you don't know her
- back her up and ask your friends to pick up their mess
- pick up the trash for your friends
- pull your sister away and tell her to leave your friends alone
- other

Scenario 5:

You and several friends bring your lunch to school and quickly go to your favorite table to eat lunch. For the past several days, the group that has eaten lunch at your table before you has left one or two items on the table or on the floor under it. You and your friends have picked up the trash for them. Today there is a lot of trash on the table and more under it. Do you

- continue to pick it up for the other students
- complain to your teacher
- talk to the cafeteria manager about not keeping the cafeteria clean
- write an article for the school newspaper
- talk to the students who left the mess
- other

Scenario 6:

You and several friends are spending the day at a local amusement park. When you go into the bathroom, your friends notice that other people have been throwing the paper towels on the floor instead of putting them into the trash can. One of your friends starts to throw his paper towel on the floor. Do you

- ask him to pick it up and put it in the trash can
- pick it up for him
- ignore it because other people do it
- other

Scenario 7:

You are on a two day hiking trip with your youth group. The rules of the trail say "pack it in, pack it out" meaning that you should bring your trash out with you. When you arrive at the campsite, you find that the group that camped there the night before had buried their trash instead of taking it out with them. Animals had dug up the trash and scattered it all over the campsite. You and your friends picked it up and put it with your groups trash. The next morning some of your friends want to bury the trash instead of carrying it out. Do you

- offer to carry it yourself
- agree that if you bury it deeper than the other group, it will be OK
- remind them that the park rules require you to take it out
- point out that litter will harm wildlife and you should take out your trash
- other

Scenario 8:

You and your grandfather have been planning a fishing trip for a long time. Finally the day arrives and you leave early in the morning to reach the lake and find the perfect spot. At your grandfather's favorite spot, there are several lines tangled in tree branches from his earlier fishing trips. In school, you've been studying about how animals are harmed by litter and fishing lines that have been left out. Do you

- ignore the fishing line, thinking that your grandfather knows more than your teacher
- pull down the fishing line and put it in your pocket when your grandfather isn't looking
- tell your grandfather what you've learned in school and hope he will help take down the old fishing line
- other

Litter-Quette Additional Resources



The Official Miss Manners has plenty to say about litter. Here is what she has to say:
Pick up litter whenever you possibly can. Tut, tut, people can be so rude, bemoans Miss Manners. Besides, if you don't do it, who will? Oh, my, says Miss Manners, if you don't, it will be there to "greet" you the next time you're there, and since litter seems to attract litter, it will probably have multiplied.

Dear Miss Manners,

My question is partly economic and partly etiquette, I hope you can help me. When I go to a "fast food" place for a quick meal I prefer not to clear the table and place my used items in the garbage. My reason or doing this is that the more I do of what ought to be an employee's job, the fewer employees they will hire. I think this is a small way to contribute to full employment. On a recent occasion I went to one such place with my son-in-law and grandchildren and we discussed this. He cleared the table himself and said that he thought this was the courteous thing to do, however, that table clearing still doesn't include wiping spills and sanitizing the surface for the next diner. I want to be courteous in a fast-food environment, so what should I do?

Gentle Reader,

First, you clean up after yourself. That is an implicit rule of fast food places, and your eating there implies your consent. Second, Miss Manners begs you to refrain from constructing scenarios to fit your idiosyncratic behavior. She believes that the chances of another employee's being hired to take charge of your trash are about nil; you would simply be giving more work to the present employees. Surely you don't want to be responsible for that. But if the establishment were to change its policy and acquire additional clean-up people, it would have to raise its prices. Surely you don't want to be responsible for pricing anyone out of an affordable meal.

There were additional comments to Miss Manners:

Manhatttanite wrote on July 19, 2009

Please apply the fast food etiquette to movie theaters as well. Ushers are NOT paid by the cup! I worked in a movie theatre as a teen (and was paid just above minimum wage after four raises!) and we only have 10 – 15 minutes to clean up the theaters between shows. Ushers are responsible for tearing tickets, lobby maintenance, and cleaning up REAL messes (spills, etc). Cleaning up after people who can't be bothered to take their drinks to the convenient trash cans outside the door really isn't a major part of the job, nor should it be.

KansasCityLass wrote on June 27, 2009

regarding fast food etiquette, I remember a more extreme recent experience I had while eating out at a fast food restaurant during slower hours. A customer had just exited the building and left behind a colossal mess on their table, including a large spilled drink which was still dripping onto the floor. During slower hours, a fast food restaurant runs a straw staff out of sheer necessity, therefore the sole gentleman working at the cash register was forced to leave his position and clean up the mess (to comply with the restaurant's safety policy, if nothing else). By the time he was able to return to his post, there were several customers waiting in line to place their orders. The inconsiderate customer who left the mess not only made the employee's job unnecessarily more difficult, but their actions also inconvenienced other customers. However, as a veteran restaurant employee of many years, I assure you that such a situation will never prompt a restaurant manager to hire more employees or lengthen their shifts.

Visit Miss Manners: <http://missmanners.com/>

Muni Manners of San Francisco also has an etiquette column. Muni Manners is an etiquette guide for the transit savvy. Here is another example of someone who wrote a letter about litter:

Have you ever noticed that some passengers abandon all practice of cleanliness when they ride public transportation? Feeling no ownership of the property, they assume their buck fifty fare offers them permission to leave a buck fifty of waste behind. Apathetic litterbuggers probably don't think twice about how one piece of trash can add up to a collection of rubbish and how that heap breeds more problems than the germs it carries. Candy wrappers, crumpled papers, gum, and rolling bottles aren't exactly considered someone else's treasure. Dirty aesthetics aside, out of

Stash the Trash

Target Level:

Grade 5

SOLs:

Science: 5.6

Materials Needed:

Role cards

A collection of possible clean picnic litter items (e.g., six-pack ring-yokes, can flip-tops, candy bar wrappers, sandwich bags, paper napkins, plastic grocery bags, polystyrene cups)

Place markers to designate a starting line and a home base (e.g., piece of rope or stick, brown paper bag, etc.)

Several strips of red cloth

Note: a large, cleared playing area will be needed

Time Needed:

One class period

Summary

Students will play an interactive group game that simulates impacts of litter pollution on a sampling of marine wildlife.

Objectives

Students will be able to understand one way that litter items may become a part of the marine environment, describe examples of litter pollution impacts, and discuss additional challenges that may face those wishing to help.

Background

The presence of litter and other debris in an aquatic environment affect not only the water quality, but also the plants and animals that live in that environment. This kind of litter, known as “marine debris” is trash found in the ocean and bay or along its shores. The source can be classified as either “ocean-based” or “land-based” litter depending upon where it enters the water. Ocean-based debris is wastes discarded by ships – merchant, military, research and commercial fishing vessels, offshore oil platforms, and recreational vessels. Land-based debris blows or washes into the water from uses such as recreational beach visitors, solid waste disposal activities, inadequate sewage treatment operations, and illegal dumping.

Marine debris creates ugly beaches, reduces tourism, adds to taxes for cleanup, and poses a threat to humans and wildlife. Yet, it is the easiest form of aquatic pollution that we, as individuals, can eliminate or at least reduce. First, we can reduce the amount of trash that is generated. People often use disposable products because they are convenient. By choosing to purchase more reusable products instead, we would greatly reduce the amount of waste generated; thereby, reducing the number of waste items that might then become litter.

Another method of reducing aquatic debris is to use the appropriate disposal practices. Disposing trash in tightly covered containers will likely keep it from becoming litter and possibly harming the local wildlife. There are also additional challenges to consider. Many recreational areas do not offer refuse bins for disposal and even fewer will have recycle bins available. The places that do have refuse containers often find that by the end of a day they are full to overflowing. People will often leave their waste tied in a plastic bag next to the overflowing refuse container. Animals will find the bags and tear them open and then some of the waste becomes litter.

Advance Preparation

Transfer the listed roles onto index-type cards. Note that multiple copies will be needed of the ‘litter item’ card. Suggestion: These may be laminated for durability and multiple usage.

Procedure

1. Tell the students they will participate in a role-playing game and take them to the clear area. Explain to the group that two teenagers are going to the beach for a day of surfing. They have loaded their supplies and are ready for a day of fun. Note that all students will participate by playing a role. They will be one of the two teenagers, an item they take to the beach, or a marine animal who gets hurt by one of their items. Lay the starting line and place a marker about 100 feet away to designate the home base.

2. Have the students draw the card of the role they will play. Ask John and Jane to share their ‘stories’ with the rest of the class. Position them behind the starting line with their container of litter items. Have each of the sea creatures tell a little about their new identities, but they should

not reveal which of the litter items they may either eat or become entangled with. Station the sea creatures between the starting line and the home base. Determine that the rest of the class are items of litter that John and Jane have left behind. Give each a red armband and have John and Jane trade their litter card identity for one of the items from their container.

3. Explain the rules of the game. The pieces of litter will not know which marine animal may try to eat them or become entangled in them as they try to quickly make their way to home base. If a piece of litter is tagged, it should freeze in place. The sea creatures may “catch” more than one piece of litter if they can. The first round of the game will end when all of the litter items have either been tagged or reach home base. The marine animals will need to give a brief explanation of how the litter they caught will impact their life. The litter items they have caught should help in the development of the animal’s creative verbal or visual telling of its story. Any litter items not caught will get to share a creative version of their anticipated impact on the environment (i.e., what do they expect to be doing for the next few years of their life?).
4. Instruct the pieces of litter to start from behind the line and head toward home base. After all movement has stopped, give the students a couple of minutes to develop their expected outcomes. Have the animals and the pieces of litter that were not caught share their brief stories with the rest of their class. Discuss how many years they think some pieces of litter may be around - 10, 20, maybe 100 years or more! Include questions such as asking where the pieces of litter may be for such a length of time (e.g., floating in the water, stuck on other floating debris, on this beach or another beach somewhere?). How might a storm affect the placement or deposition of litter? Might the litter also travel quite long distances?
5. Help students summarize the detrimental impact this litter has had on these species of marine wildlife.

Wrap Up/Assessment

Have the students return to their seats or sit in a circle. Ask John and Jane for a couple of suggestions of things they might do differently when visiting the beach again. Using their suggestions, illicit group discussion of how people might prevent litter from ending up in the water and endangering the wildlife. Guide the discussion to include alternatives to reduce the amount of trash generated in addition to ones that include use of appropriate disposal practices. Assist the class in determining a possible solution to John’s and Jane’s disposal problem. (In all honesty, they will probably have to carry their refuse all the way home with them to properly dispose of it.)

Extension

Have the students research an additional marine animal of their choice and develop an environmental impact statement. The written report should provide a brief paragraph of basic background information relating to their species’ particular environment and needs. It should also include a second paragraph describing a litter item that could likely be found in its environment, and the possible impact to its kind.

John Doe

A teenager and Jane's brother

You are a surfer and go to the beach as often as possible. Your friends will often go too. You usually travel back and forth in the new car you received after graduating from high school. You and your friends always bring food and drinks. After a great day, you all pack up to go home. You want to keep your new car looking really nice and clean, and there aren't any trash containers nearby. You usually leave your litter laying on the beach.

Jane Doe

A teenager and John's sister

You are just learning how to surf and love to go to the beach as often as your brother will let you come along. You always bring food and drinks for the day and it is your job to be sure everything is in the cooler that should be. After a great day, you help pack up to go home. You know John doesn't like a mess in his new car, and there aren't any trash containers nearby. You usually leave your litter laying on the beach.

A Piece of Litter

Ted Turtle

Background to share:

Sea turtles have evolved a streamlined shell (carapace), strong flippers, and salt-excreting glands in adaptation to their marine environment. Most live in tropical waters. They primarily feed on jellyfish. Female sea turtles come onto beaches and lay their eggs in holes that they dig and then cover. The young hatch in 5 to 10 weeks, and generally do not exceed 2 inches in length.

Suggestion for beginning of a story:

You hatch and climb up out of the sand. You crawl as fast as your little legs will carry you toward the water. The waves have washed over the litter on the beach, making quite a mess for you to get through. You might become entangled in something (plastic 6-pack ring?) and drag it along with you; it won't come off. You'd like to get to the water - but then could you even swim? You are hungry and wonder what the bubbly things are that are floating and rocking in the water... maybe jellyfish? (Sea turtles often mistake plastic bags for jellyfish and eat them, resulting in severe distress and often death...)

Hooty Blowfish

Background to share: Puffers, also called blowfish, globefish, or swellfish, are more than 100 species of fish with the ability to inflate their stomachs with water or air to about twice their size. Their jaw teeth are fused into a small, hard, cutting beak useful for grasping and crushing hard-shelled prey. The fused teeth in both jaws are separated by a space, giving the puffer the appearance of having four large teeth. Most live in tropical waters. The northern puffer, found from Florida to Cape Cod, grows to about 14 inches long.

Suggestion for beginning of a story:

You swim through the fast moving water. The waves have washed over the litter John and Jane left on the beach and have been breaking it up and pulling the pieces out farther and farther into the water. It appears there is a feast of tasty bugs on the surface above you, just waiting to be captured! How hungry are you?...

Gibson Gull

Background to share:

Gulls are found in largest numbers along the coastal shores. They are primarily scavengers and prey on anything they can find. A first choice of food might be dead animal matter or fish caught in shallow waters. Some gulls are known to carry hard-shelled mollusks aloft and drop them on hard pavements or rocks to break the shells. Others are seen in garbage dumps. They have a stout, hooked bill and their feet are fully webbed except for a free hind-toe.

Suggestion for beginning of a story:

You spot the debris left by John and Jane. You decide you might be hungry and head for a crust of bread. You think "Oooh-eeeeeee! Look at all the choices!" The shiny metal flip tops from the drink cans look interesting too. You might eat them. And the polystyrene cups... a whole meal with just one... "Garbage is garbage" (or

A Piece of Litter

A Piece of Litter

A Piece of Litter

Aching Gull

Target Level:

Grade 5

SOLs:

Science 5.6

Materials Needed:

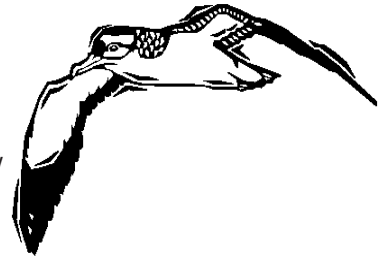
Large bag of cotton balls
4 12-16 oz. plastic drink bottles
of same size (e.g., soda,
juice, or water)
4 spoons
Scissors and strong tape
(e.g., duct tape)
Bucket or dishpan
Plastic packing pieces
One six-pack plastic ring

Time Needed:

One class period

Summary

Students will investigate the negative effect litter has on a gull through a simulated 'Hunger Pains' team relay activity, and develop expanded relations and discussion.

**Objectives**

Students will be able to identify and describe impacts litter may have on aquatic wildlife, and hypothesize methods of minimizing or eliminating these types of challenges.

Background

Animals, like people, also need a healthy environment in which to live. This includes a habitat (food, water, shelter, and space) that is as pollution-free as possible. Litter contributes to the pollution that affects many animals' habitat components. Many types of gulls depend on small fish as their main food source. Other kinds of animals feed on smaller animals or vegetation that are found near bodies of water. The consequences of litter being present are often detrimental, and are usually preventable. This activity identifies particular challenges that litter presents to animals that try to feed on or become entangled in foreign objects in their habitat.

Preparation

1. Label bottles (1 - 4).
2. Set up bottles to represent gulls as listed:
 - A. Gull that is healthy
(cut off top neck of bottle to make a large unobstructed opening for food)
 - B. Gull with a broken beak
(cut the same opening; put a piece of tape across the middle part of the opening; make jagged cuts part way in the tape so food can carefully make it through)
 - C. Gull with a constricted neck and beak
(do not cut bottle; wrap a 6-pack plastic holder around upper outside of bottle)
 - D. Gull that has eaten plastic pieces
(cut off the neck of the bottle as above; fill the bottle threequarters full with packing pieces)
3. Place "sea gulls" in a row about a 15-foot distance from a designated starting line.
4. Put plenty of "minnows" (cotton balls) in the bucket or dishpan and place it to one side of the walking path, halfway between the gulls and the starting line.

**Procedure**

1. Explain to the students that will have the opportunity to play a game called "Hunger Pains" and that the bottles they see represent gulls. Ask students what gulls might eat.

Discuss the minnow/cottonball food source and that these particular gulls face may have an impaired ability to eat.

2. Divide the students into four teams. Have each group form a line, with the first person of each team standing on the starting line. Designate a “sea gull” by its number for each team.
3. Explain to the students that they will feed as many “minnows” to their team’s seagull as possible in a given amount of time. The first student in each line should pick up one piece of food with their spoon and place it into their hungry seagull. For the food to count, it must be in the bottom of the bottle (representing the seagull’s stomach). If the piece falls on the ground, the student can scoop it up. After the food is placed in the gull, the student should return to their team, give their next team member the spoon, and the new student can take their turn.
4. Have the teams stop their relay after 3 minutes. The current first person in each line should count the amount of food in their gull’s stomach. Have the students report to the class how much food actually made it into their gull’s stomach. Did anything prevent or slow down their gull’s ability to eat? What, if anything, may have been wrong with their gull.

WrapUp/Assessment

1. Give each team a piece of paper. Explain that each group should choose a different animal that might also be affected by litter on a beach or in the ocean waters. The groups should record their animal, identify the sources of litter that may affect their animal’s environment, and predict possible problems the animals will encounter.
2. After about ten minutes, ask each group to share their information with the rest of the class. Engage group discussion of possible ways to prevent or reduce litter in these areas.

Extension

Give the class the opportunity to help their local wildlife. Work with the class toward planning a litter clean-up at a local beach, river, or lake.

Example Worksheet

Name of Animal	Specific piece of litter that could be found	Possible problems

Litterblock Ramble

Target Level:
Grade 6

SOLs:
Science: 6.11

Materials Needed:
“Litterblock” signs
Trash can sign
Blindfolds (bandannas or other pieces of material)
Note: a large, cleared playing area will be needed

Time Needed:
One class period

Summary

Students will navigate around “roadblocks” in an interactive exercise that stimulates solving litter challenges.

Objectives

Students will be able to examine why people litter, draw conclusions about personal choices, and be able to discuss litter policies. They will also be able to devise solutions to the “litterblocks” or barriers to litter prevention.



Background

One way to change inappropriate behavior (such as littering) is to help people find a reason to change or a solution to the problem. In this activity, students analyze the reasons why people litter and suggest solutions for these reasons. Some of the reasons people use for not disposing of litter are real problems, for example, “the trash can was full, so I put my bag of trash next to it.” Other reasons, such as “I saw someone else doing it,” are founded in personal attitudes and values.

Another way to help people change their behavior is to help them understand the impact of their behavior. They can look at the consequences or costs of the behavior and examine the trade off or benefits of change. Either the person will have to find the appropriate receptacle or carry the trash home with them or they will choose to litter somewhere. The “cost” of littering might be the cost of a visit to a hospital emergency room visit for a child stung by bees that were attracted to a drink can thrown on a playground or the cost of a veterinarian to stitch a dog’s paw cut from broken glass in a picnic area. The benefits would be a clean, safe park for all visitors.

Advance Preparation

1. Cut pieces of poster board or cardboard into similar pieces. Record a different reason onto each of the signs (from the examples on the Copy Page). Put holes in the top of each sign and lace them with string or yarn for students to wear around their necks. These may be laminated for multiple usage.
2. Copy, cut, and paste the trash can picture onto a separate sign. String this card for a student to wear also, and laminate if desired.

Procedure

1. Ask students if they have ever littered. Discuss reasons why people might have littered. Record these reasons where everyone can see them.
2. Tell the class they will play a game that will help them develop solutions to the roadblocks they listed. Divide the class into two groups. The first group should include about three-fourths of the students. Give each student a sign to wear. Have the students turn them over so no one will see their excuses for the moment.
3. Ask for a volunteer or assign a student from the second group to be the “trash can.” Give him/her the picture of the trash can to wear. Explain that this will be the only person allowed to talk during the game-- he or she will need to talk so that the “park visitors” can find the trash can.
4. Position the trash can at the far end of the playing area. Have the park visitors stand in a line across the near end. Explain that after the park visitors have put on their blindfolds, the

litterblock signs will randomly arrange themselves between the park visitors and the trash can. Once in place, the litterblocks cannot move again, nor can they speak. Tell the park visitors that they should try and reach the trash can. If they run into a litterblock, they should stop and remove their blindfolds. Explain that after all visitors have either stumbled into a litterblock or reached the trash can, each will be given the opportunity to announce its progress. If facing a litterblock, he/she will tell how they would solve or prevent that excuse for littering.

5. After the park visitors have put on their blindfolds, give the “Litterblocks” a chance to position themselves and turn their signs over. Have the park visitors begin to navigate themselves through the litterblocks. On the first round, few if any park visitors will make it to the trash can. After a particular litterblock is solved, that person will remove his or her sign and stand along the sides of the playing area.

6. Have the park visitors return to their starting positions and replace their blindfolds. Keep repeating #5 until several park visitors have reached the trash can. The trash should encourage visitors to move forward by making comments like “It’s messy here,” or “I’m hungry,” etc.

Wrap Up/Assessment

1. Ask the students why they think it is easier for the park visitors to reach the trash can when there are fewer litterblocks. Ask the students if they think that the litterblocks are difficult barriers to overcome. Which litterblocks are tangible problems are situations they can control? Are any of the barriers due to perspective and/or values?

2. Discuss the originally generated list of reasons why people might litter to other public places (e.g., shopping centers, sports fields, and school grounds). Ask the students if there are positive things that can be done to address the public’s “litterblocks”. Discuss ways to reduce and prevent the amount of litter. Have students suggest the general differences in costs/impacts of litter clean-up versus litter prevention. What is involved that would have an associated cost?

Variation

Include a recycling bin to be placed beside the trash can during the rounds. The students will need to assess whether their litter item can be recycled prior to “depositing it in one of the receptacles”. Note: Additional materials will be needed: a recycling bin sign and a collection of (clean) common litter items.

Confirm the students’ understanding that the term recycle (re-cycle) means to use over again during Step 3. Additionally, ensure their recognition of the recycling symbol. Explain that the three arrows represent the three stages involved in recycling materials: collect, reprocess, and reuse. Note that when a product is recycled, it does not go into our garbage but is reused (either for the same or similar purpose, or made into something new).



Why Shouldn't I?

There's already trash there.

I don't want to mess up my car.

Too hard to find a trash can.

Mom would get upset if she knew I ate before dinner.

Everyone does it.

Someone else will pick it up for me.

It's just a candy wrapper.

It's too heavy to carry along the trail.

Nobody told me not to.

The trash can was too yucky to touch.

Animals will eat the apple core.

It's so tiny, it won't matter.

Bees were around the trash can.

I saw an adult do it.

I don't care about the park.

There wasn't a sign telling me not to litter.

It fell out of my pocket.

Preventable Journey

Target Level:

Grade 3 and 4

SOLs:

Health: 3.19

Science: 3.1, 3.10, 4.1, 4.8

English: 3.7, 4.7

Materials Needed:

Large playing area

Cardboard, tape, and markers to make dice and label stations; alternately 4 inch square boxes can be purchased at mailing centers.

Copy of 'Tony, the Trash

Bag' sheet and pencil for each student

Note: a large playing area will be needed.

Summary

Students will track the movement of a piece of litter as it moves through different land and aquatic environments.

Objectives

Students will be able to describe the ecological impact of one piece of litter by following and predicting consequences of misplaced trash, i.e. litter. Students will be able to explain the possible effects of litter in both oral and written format.

Background

Often the environmental consequences of what we do and don't do are never fully realized. This activity will trace the possible path of one type of litter-- the plastic bags obtained from grocery, department, drug and other stores.

Advance Preparation

1. Make a sign for each of the following stations: *Roadside, Front Yard, Tree, Storm Drain, River, Chesapeake Bay, Ocean, Beach, Turtle*. Tape each sign to a different location in the room (allow room for students to move from one station to another).
2. Construct nine dice or cardboard cubes, one for each station. Each cube should have six sides and be labeled as listed below. (Include station name on each cube to easily identify the cubes in the future.) Place each cube at its corresponding station prior to beginning activity.
 - * *Roadside Cube:* 1 side- front yard; 1 side- storm drain; 2 sides- stay; 2 sides- tree
 - * *Front Yard Cube:* 1 side- storm drain; 1 side- roadside; 2 sides- tree; 1 side- stay
 - * *Tree Cube:* 2 sides- stay; 1 side--front yard; 2 sides-- roadside; 1 side- river
 - * *Storm Drain Cube:* 3 sides- river; 3 sides- stay
 - * *River Cube:* 1 side beach; 2 sides Chesapeake Bay; 3 sides stay
 - * *Chesapeake Bay Cube:* 2 sides ocean; 2 sides beach; 2 sides stay
 - * *Ocean Cube:* 4 sides stay; 1 side beach; 1 side turtle
 - * *Beach Cube:* 3 sides- ocean; 2 sides- Chesapeake Bay; 1 side- stay
 - * *Turtle Cube:* 5 sides--stay; 1 side- beach

Procedure

1. Begin by asking students to discuss litter and predict its impacts. Ask students if a plastic bag, such as we all receive from grocery, department, and drug stores, would be considered litter. Establish a working definition of the word "litter" through continued discussion. A determination is reached with an understanding of the appropriate use and disposal of an item.
2. Explain to the students that they will play a game that will illustrate possibilities in the lifespan of a plastic bag that has become litter. Each student will represent one plastic bag that had been properly placed into a waste/trash container; but the container had no lid, and as the wind blew, the bag became litter.

Ask students to predict where the bag will land. Point out the stations around the room and explain that each student will start their lives as litter at one of the nine stations.

3. Explain the rules: Each student should take a turn rolling the cube at their starting station. The label facing up on the cube will determine where that particular plastic

bag's next destination will be. The person should then move to the back of the line at its new destination and wait his/her turn to roll the die there. If the cube shows "stay", the person should move to the back of the line at that same station and wait for his/her turn to roll the cube again.

4. Give each student a piece of paper and pencil and have them record the numbers 1 through 10 down the left side (or make copies of the student page). During their "travels," each student will keep a record of where they are traveling and will have ten opportunities to move. Note that it is possible (though not probable) for a plastic bag to stay in one location for the entire game.
5. Break students into nine small groups and assign each group to a different starting station. Have students record their initial location/station beside their space numbered 1. Now, let the wind blow and the rolling begin! Remind students to record their locations after each roll.
6. Prompt discussion of the journeys of the plastic bags. Sample starter questions include:
 - How many of you were at one station more than one turn?
 - How many were in the trees? In the ocean?
 - How long did you stay there? Did anyone get "stuck" in one place?
 - Why might this happen? (Examples might be that the bags could get caught in branches, or hooked onto things in the ocean)

Variation

In agricultural areas where farms are common, plastic bags can cause additional problems. These bags can blow into the barnyards or pastures of the animals, or they can be found in hay bales if there are plastic bags in the hay field when hay is being baled. As cows and horses tend to be curious creatures, they will often eat plastic bags. The bags will fill areas of their stomachs making them feel full when in reality they still need food. Or the bags can pass through the stomach causing a blockage in the intestine. One bag can cause major problems for a horse or cow if it blocks the intestines.

Barnyard Cube: 1 side- horse; 1 side- farm pond; 1 side- tree; 1 side- front yard; 1 side- road side; 1 side- stream/river

Farm Pond Cube: 3 sides- stay, 1 side- stream/river; 1 side- horse; 1 side- Bay

Stream/River Cube: 2 sides- stay; 2 sides- roadside; 2 sides- Bay

Horse Cube: 6 sides- stay

Roadside Cube: 1 side- front yard; 2 sides- stay; 1 side- tree; 1 side- barnyard; 1 side- stream/river

Tree Cube: 1 side- barnyard; 2 sides- front yard; 2 sides- roadsides; 1 side- farm pond;

Ocean Cube: 4 sides- stay; 2 sides- Bay

Bay Cube: 2 sides- stay; 2 sides- ocean; 2 sides- stream/river

Front Yard Cube: 2 sides- barnyard; 2 sides- tree; 2 sides- roadside

Wrap Up/Assessment

1. Explain that the students have lots of 'food for thought' in the records of their journeys! Their follow-up assignment is to use the data generated in their record to write an appropriate and descriptive short story. Ask them to convince the reader about the fate of litter. Be sure to include "If only....." or "The next time I hope..."

Note: This activity was adapted with permission from **Project WET**, for more information, please contact the Project WET Coordinator, Virginia Department of Environmental Quality, P.O. Box 10009, Richmond, VA 23240-0009. (800)592-54VA. This guide is only available through attendance at a workshop.

Extensions

1. Have students discuss ways to reduce and prevent litter in their community.
2. Have students research and write a similar scenario utilizing a different piece of litter. Suggestions might include an aluminum soda can, metal food can, plastic milk jug, six-pack holder, glass juice bottle, newspaper, old written test, candy bar wrapper, etc. The scenario should include possible places visited by their piece of litter and it's possible impacts. Students should also include the natural resources used to make the item as well as the amount of time it might take "their litter" to decompose.

For more activities about marine debris, please refer to the following:

Turning the Tide on Trash: A Learning Guide on Marine Debris: U.S. Environmental Protection Agency, Ocean and Coastal Protection Division, 401 M St., SW, Washington, DC 20460.

The Preventable Journey Score Card

Hi! My name is Tony, the Trash Bag.

I started life carrying groceries home from a store. I had gotten dirty and torn and the concerned citizen using me put me into a trash can. My journey of experiences begins as the wind picks up later in the day.

Oh no, there's no cover on the trash can! I am wooshed out and away! I landed.....

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.



How Long Will It Be There?

Target Level:
Grade 7

SOLs:
Science: LS.1, LS.10, LS.14

Materials Needed:
Pictures and paper
(see Preparation)

Summary

Students predict how long it takes specific items to decompose and then compare their predictions to the correct times.

Objectives

Students will understand the process of decomposition, the necessary requirements for biodegradation to occur, the role of decomposition/degradation in nature and what materials are likely to degrade. Understanding litter prevention and composting techniques as important waste management techniques is desired.



Preparation

1. Prepare a display board by gathering pictures of various items that can be seen as roadside litter, such as a glass bottle, leather shoe, magazine, aluminum can, styrofoam box, plastic bag, milk carton, plastic bottle, newspaper, or tire and attaching the pictures to the display board. Next to (or below) each picture attach a piece of the “fuzzy” part of a Velcro strip. Make signs that give the length of time it takes each item to decompose and attach the “hook” part of the Velcro to the back of these signs. Students can then attach the “time” cards to the picture they think it matches.
2. Make paper ballots by writing the names of the items you will be putting on your display board with a space next to it for the students to predict how long it takes for the item to decompose.

Procedure:

1. Have students predict how long it might take items to decompose. Have each student fill out a ballot and fold it in half and write their name on the outside. Collect these ballots to compare the students’ predictions with the correct times at the end of the activity.
2. Choose 2-3 students to gather the “ballots” and record the predictions for the decomposition time of each item. These students can be compiling this data while the teams are preparing their answers.
3. Choose 2 teams of 4-5 students that will take the time cards and attach them next to the picture of the item that takes that long to decompose. Team A will have 5 minutes to make their predictions. Answers will be recorded and saved. Team B will then have 5 minutes to make their predictions. Their answers will then be recorded.
4. Write the names of the items on the board or overhead and the answers from both teams. Compare the answers and have the class discuss each item and what causes it to take a specific length of time to decompose— or how we know how long it takes.
5. Have students discuss how these items could have been littered and what they can do about it. Discuss what is biodegradable and what is the best disposal method for these.

Extensions

This activity would easily lend itself to collecting pieces of the litter and doing research on decomposition, comparing the length of time it takes in the sunlight, buried in soil or buried under leaves and other natural debris.

Decompositon Rates

Apple Core: 1 - 6 weeks

Paper: 2 - 4 weeks

Cigarette Filter: 13 years

Aluminum Can: 200 - 500 years

Plastic: 500 years

Rubber Tire: No Known Disintegration

1 - 6 Weeks	2 - 4 Weeks
13 Years	200-500 Years
500 Years	No Known Disintegration



I Spy Litter...Litter...Litter

Directions:

Observe the litter in your designated spot. What types of litter do you see? What is the impact that it can have on the environment? Example; can an animal consume it or become entangled in it? When the litter is breaking down can it leak toxics into the environment? How long will it take to decompose? What Location did you choose for your observation? Parking Lot, field, picnic area, swimming area, etc.

Item of Trash/Pollution	Tally	How long will it take to decompose? (Your Guess)	How long will it take to decompose? Group Consensus – Most common estimate among your peers	What the scientists say about the estimated decomposition time
Aluminum Can				
Banana/orange peel				
Carry-out fast food bag (Paper)				
Carry-out Tray (Styrofoam)				
Cigarette Butt				
Cotton Rag				
Glass Bottle				
Napkins				
Plastic Bag				
Plastic Beverage container				

Choices:

1 million years	1-5 months	10-20 Years	200 – 500 Years	1 – 3 Weeks
2 – 5 Weeks	1-5 Years	1 million Years	4-8 Months	100 Years

Check the How Long Does it Last Litter Decomposition Rate for the answers.

Extension Activities:

Have the students pick different areas. Do a class comparison. Students can map their areas and record the quantity of each type of litter. They can use this data to create a variety of different types of graphs.

Roadside Litter

Decomposition Chart for litter*: (Source: California Waste Mgmt Bulletin)

Banana/orange Peel	2-5 weeks
Cotton rag	1-5 months
Cigarette butt	1-5 years
Wool clothing	1-5 years
Plastic-coated paper	5 years
Plastic bag	10-20 years
Painted wooden stake	13 years
Plastic film container	20-30 years
Nylon fabric	30-40 years
Leather	up to 50 years
Rubber boot sole	50-80 years
Aluminum can	200-500 years
Plastic 6-pack cover	450 years
Glass bottle	1 million years

Others: (various sources)

Traffic Ticket	2-4 weeks
Rope	3-14 months
Bamboo pole	1-3 years
Tin can	100 years
Newspaper	3-6 months
Carry-out food bag	4-8 months
Napkins	1-3 weeks
Plastic beverage containers	100 years
Carry-out tray	3-9 months

** Decomposition depends on weather and site conditions: warm, wet conditions enhance decomposition, as does exposure to sunlight and oxygen. Material sheltered from weather and sunlight requires increased time to decompose.*

Litter...Where Does it Come from?



Is litter the same everywhere? Go for a walk and look at the litter. Think about what you find and analyze what you find below.

Places to Examine	Type of litter Observed/ Number of Each	Total Pieces of Trash
Walking paths/trails		
Campsites		
Fire Pits		
Piers		
Beach/Waterfront		
Boat Landing		
Picnic Area		
Visitor Center		
Bath House		
Bathroom		
Other Buildings		

Questions:

1. Where did you find the most litter? Is there more litter of one type in any single location? Why do you think there is more litter in one location than another?
2. Where did you find the least amount of litter?
3. How does litter differ in the different sites that you examined? Do you see any patterns? Is there more litter in one particular location of one type? Can you think of a reason for this?

Dilemmas! You Make the Decision

Target Level:
Grades 7 & 8

SOLs:
Science: PS.1
English: 8.4, 8.6
History & Social Science (Civics): 7.1, 7.4, 7.7

Materials Needed:
Dilemma Cards

Time Needed:
One class period

Summary

Students will read and analyze a given litter dilemma. They will propose a solution by reviewing it from the perspective of a specific audience.

Objectives

Students will be able to discuss sources of litter and associated challenges. They will also be able to analyze reasons for the litter problems, and bring a generated solution to consensus.

Background

People frequently encounter others that view the same situation differently than they do. The main reason is because of the interests of the individual making the choice. In organizations and groups the differing points of view are still expressed but are looked at from the perspective of how to best reach the desired outcome.

This activity provides litter-related topics that could be viewed differently by various groups of people: groups that have to look at littered areas, those that would have to clean the litter, and the ones who have to pay for the litter to be removed. The students will need to decide on the perspective of a specific group and make a decision regarding their given litter problem.

Advance Preparation

Copy the dilemmas onto card stock. These may be laminated for multiple usage.

Procedure

1. Ask students how a company would select a television show to advertise their product. Example questions follow: Who watches Saturday morning cartoon shows? What is the “target audience”? Would they expect to see a luxury car commercial during this time frame? Why or why not? What type of product might they see advertised during that time frame?

Ask students if different target groups might react differently to similar situations. For example: A professional basketball player is coming to your town. Would a member of the high school band work as hard to get a ticket to see the ball player as a member of the basketball team? Why do think there is a difference in their behaviors?

2. Discuss whether different solutions might be proposed if different groups were making the decision about the same litter dilemma. Ask the students how a group of potential investors would view litter on a bus or transit system in comparison to how it would be viewed by commuters on the same transit system.

3. Divide the students into six similar sized groups. Give each group a dilemma card and instruct them to make a decision on their situation based on the type of group they represent. Explain that all members of the group must agree before a decision can be reached. Have each group design an advertisement illustrating their decision. It should include a button, slogan, public service announcement, or skit that will be shared with the rest of their class.

4. Give the groups approximately 20 minutes to discuss their litter issues, agree on their solutions, and develop their advertisements.

Wrap Up/Assessment

Allow time for each group to come forward and share their dilemma and solution. When all groups have participated, discuss how the advertisements are hoped to affect the targeted audiences in the scenarios. Note also that any solution of a problem was begun with discussion and increased awareness of that challenge.

Extension

Have each group select a school (or appropriately related) litter challenge. They should design and carryout an actual advertising campaign that will educate fellow school members and/or the public about their litter problem.

-----Copy Page----- **Dilemma Cards**

The city wants to build a ballpark for a local soccer team where a field is currently located. A baseball stadium in a nearby city has had huge problems with people not placing their trash in trash cans. Many concerned citizens feel this new soccer field will have the same problem. You are the town council and must make a decision regarding the building of the soccer field. Should you allow the soccer field to be developed? If you do, how would you make the citizens feel that this soccer field will not have the same litter problems?

Smith Elementary School is having their 10th anniversary celebration with a picnic. The plans include lunch, cake, and giving each student a helium filled balloon to release as the band starts playing "Happy Birthday". The school is located 50 miles from the bay. The bay is rich with marine life. The currents will carry the balloons high up into the atmosphere and over the bay. It is known that the balloons will explode due to pressure and the elements of the weather. Fragments of the bright-colored balloons will float in the water and look like food to many animals living in the bay. The school ecology club wants to stop the balloon release. The final decision has been passed to you, a group of school officials. If you should decide the balloons will not be released, then you would need to suggest an alternative activity.

You are the owners of a new boutique and do not have a lot of money that can be spent on advertising. Newspaper and radio advertisements seem pretty expensive, so you have been making fliers and having them distributed on car windshields. People in the community have begun to complain that your fliers are the littering parking lots and neighboring yards. You investigate and find that many drivers are simply tossing the fliers on the ground. This is your only way of advertising. What can you do to advertise on a very low budget, or to keep the fliers from being a litter problem?

Your town park has a large lake with a healthy population of ducks. Many families go to the lake on weekends to feed the ducks and use the playground. Every Monday, park personnel spend several hours cleaning all the litter and debris left from the weekend. Due to recent budget cuts, the personnel that have been taking care of the litter are needed for other assignments. As members of the local Friends of the Park organization, the park officials have asked you to help find a solution to the litter problem.

As a member of the high school Athletic Association you are attending an emergency meeting to solve a litter problem. Several of the visiting sports teams have been leaving large amounts of trash in the parking lot and in the locker room. Other schools have been complaining that your teams are guilty of littering their parking lots and locker rooms too. What type of solution can you suggest that would prevent this kind of littering problem?

You are members of the church council. There has been a bus stop in front of your church for the area's students for many years. Recently you have been having a problem with the students cleaning out their backpacks and leaving paper all over the front yard of the church. You need to come up with a solution that will provide a safe bus stop for the students and, at the same time, keep your church yard clean.

Litterland

Target Level:

High School, for use with elementary grades

Volunteer and community service projects

Materials Needed:

A variety of handout literature for students' research use

Copy of the "Oh No! Litterbug!" example game sheet for each group

Paper, thin-line markers, scissors, clear laminating paper

A quart. size sandwich bag for each group

Samples of a variety of childrens' games (e.g., board games, card games, etc.)

Summary

Students will research and create entertaining and informative games to teach elementary age students key concepts of litter and litter prevention in a carnival format!

Objectives

Students will demonstrate knowledge of litter and related solid waste management practices. They will develop games for use with elementary age students to fulfill volunteer and community service project requirements.

Background

Using litter materials presently available and widely recommended for use on litter topics - EPA, DEQ, etc., have students do research about "hot" topics in litter and solid waste and develop games.

Also recommend some game books such as "New Games" and others on noncompetitive games for students to use as research materials. Students can bring in games that they enjoyed as a young child or ones used by younger siblings.

Procedure

1. Establish a working definition of the word 'litter'.
2. Explain that the students will be providing a community service as they assist with the development of a trunk (or box) of interesting games. These will be aimed toward helping elementary age students understand concepts of litter and its prevention. This trunk might be used by themselves or by others for any number of community celebrations or individual class programs with elementary age students. The community interaction possibilities will be endless once there is a trunk of resource activities developed!

Have students break into several working groups of three to five students each. Explain that the games they will develop can be based on board games (Candyland, Monopoly), television games (Jeopardy, Wheel of Fortune), card games (Go Fish, Old Maid), or classic party games (Pin the Tail on the Donkey) as examples. In short, students should adapt games they feel elementary age students might be familiar with and enjoy.

3. For the purpose of being an idea starter and as an example, give each group a copy of the "Oh No! Litterbug!" game sheet. Help students walk through the development of the activity through review and discussion of the game sheet. Suggestions to accomplish this follow:
 - Note it has a name and any general pertinent information.
 - Ask for the stated Objective. (What is desired for young students to get out of the game? And yes, it does need to be fun too.)
 - Have students determine which familiar game the activity is similar to. Note that the wording in the rules are adapted from "Old Maid" to make it work as "Oh No! Litterbug!"
 - Instruct the students to record their group members' names on their game sheets.
4. Have each group make the playing pieces needed for their game. In this case, cards - (52, 4 each of 13 items of litter). Give each group 6 card master sheets and explain that each group should develop a separate deck of cards. Brainstorm possible litter items that might be drawn onto the cards. Note again that each of the thirteen items should have four cards exactly alike. Have art supplies available and allow groups approximately 15 minutes to develop their card decks.

5. Give students an opportunity to play their new game once through within their group, and ask if they feel any revisions may be needed for use with young students. Have groups neatly fold their game sheets and insert them in a plastic bag with their deck of cards. Wrap up this portion of the activity with discussion of thoughts toward reinforcing the playing pieces for multiple uses and interesting ways to 'package' their games. Except for the 'finishing touches' (possibly laminating, and designing a fancy container/storage package), the class now already has a great start on a trunk of games as a project.

6. Charge the groups with developing additional games. If you are a visiting speaker, you might ask to come back to view their accomplishment! Mention the literature you have brought and that it will be available for their use.

Instructions for each group

- Research a litter topic.
- Consider an appropriate game format to adapt.
- Decide on an Objective for young students to understand from playing the game.
- Develop a game sheet and rules.
- Design the board or materials needed.
- Play the game to ensure that it 'works'.
- Reinforce any pieces to make them reusable.
- Neatly package the game with a clean copy of a game sheet, ready to be shared!

Wrap Up/Assessment

Allow students time to develop games, which they will share with the other groups on a designated day. Restate that the games should teach younger students and the community about litter and litter prevention.

After presentations, note the availability of the resource trunk with the games and the students ability to visit elementary schools, civic groups, PTA, etc. Additional thoughts might include staffing a booth at a local ecology related event such as Virginia's Operation Spruce-Up or Fall River Renaissance. Visit www.vanaturally.com for ideas and calendar of events.

Variations/Extensions

1. Encourage use of math, language, and science games.
2. Suggest and discuss possible use of donated materials and reused materials.
3. Have students utilize a computer to research and develop their games.

One example would be for the group to develop a crossword or word search puzzle created with a software construction kit. These kits are available for free download trial on the Internet. One source is from the Puzzle Connection homepage at the following address: <http://www.smartcode.com/puzzle.htm>

The Commonwealth of Virginia vs. Lit R. Bug

Target Level:
High School

SOLs:
Science: Bio.9, ES.2
Government: 12.8

Materials Needed:
Role cards
Copies of the litter laws
Note: Twenty or more students

Time Needed:
Approximately 2 hours or two class periods

** Note: For a Class I misdemeanor, a person issued a summons would appear in General District Court. The judge would hear both sides and make a decision without a jury trial. A jury is used in this simulation to allow all students to participate.*

Background

Virginia state and local laws pertaining to litter are similar in intent, although the wording may differ. See the included Copy Sheet for the state laws regarding roadside litter.

Preparation

1. Copy the Role Cards and affix them to index-type cards or laminate them for durability. *Note:* Three copies of each card will be needed for the following roles: defendant, police officer, and expert witness. (One card will be given to each person playing the role, and one card to each of the two attorneys.) Twelve copies of the juror's card will be needed, and the appropriate number of the passenger's role card will need to be determined so that each student has a role.
2. Make four copies of the state laws regarding roadside litter. One copy will be given to the judge, one to each of the two attorneys, and one to the head juror during deliberation.
3. Review basic courtroom procedures with the class. Explain that after the facts are presented, the jury will decide if the defendant is guilty or innocent, and will recommend the penalty according to the appropriate *Code of Virginia*.

Procedure

1. Select students to role play the following:
1 judge, 1 Commonwealth's or district attorney, 1 defense attorney, 1 bailiff, 1 citizen accused of littering, 1 police officer, 1 - 3 passengers in the car with the defendant, 1 expert witness, and 12 jurors*. The rest of the class should be reporters covering the trial. *Suggestion:* You might choose to invite a local judge or attorney to preside over the trial.
2. Have the students read their role cards and assume the identity described. Ensure that the students understand their roles. Give out the additional copies of role cards and codes as needed. If there will be reporters included in the trial, discuss any differences between the types of news media, e.g. television, radio, print, and on-line and the requirements of each reporter. Also, note the difference between "reliable" newspapers and "tabloid-type" papers.
3. When everyone has read their cards and is ready, let the bailiff begin by introducing the judge, "All rise, the Honorable I.M. Law, presiding. Court is now in session." The judge will call the prosecution first to present its case, then the defense attorney. Each attorney can call witnesses to testify. The judge will ask if the other attorney wants to ask question or "cross-examine" the witness(es).
4. While the jury is deliberating in a "private" corner of the "Court Room," have the media polish their reports. Ask the jury to write "guilty" or "not guilty" on a slip of paper when they have reached a conclusion. The head juror will hold the announcement until after the media reports. After the jury reaches their verdict, but before the verdict is announced, the reporters will make their presentations to the group.

Wrap Up/Assessment

Allow students the time to review the *Code of Virginia* and discuss why there are laws pertaining to litter. Do they think the laws are necessary? Would they change them? If so, how? Ask if any of the media reports would have influenced how the jurors voted. Why are juries sequestered?

Extension

The students can present their (45 minute) trial for a local middle school class or school event.

Code of Virginia references for considering roadside litter

Section 33.1-346. Dumping trash on highway or private property

(a) Any person shall be guilty of a Class 1 Misdemeanor who dumps or otherwise disposes of trash, garbage, refuse, litter or other unsightly matter on public property, including public highway, right-of-way, property adjacent to such highway or right-of-way, or on private property without the written consent of the owner thereof or his agent.

(b) When any person is arrested for a violation of this section, and the matter alleged to have been illegally dumped or disposed or has been ejected from a motor vehicle, or transported to the disposal site in a motor vehicle, the arresting officer may comply with provisions of *Section 46.2-936* in making such arrest.

(c) When a violation of the provisions of this section has been observed by any person, and matter illegally dumped or disposed of has been ejected or removed from a motor vehicle, the owner or operator of such motor vehicle shall be presumed to be the person ejecting or disposing of such matter. However, such presumption shall be rebuttable by competent evidence.

(d) Any person convicted of such violation shall be guilty of a Class I misdemeanor.

(e) The governing bodies of counties, cities and towns are hereby authorized to adopt ordinances not in conflict with the provisions of the section and may repeal, amend or modify such ordinances.

Section 33.1-346.1 Penalties for violation of Section 33.1346

Upon conviction of any person for a violation of *Section 33.1346*, the court may suspend the imposition of any sentence on condition that the defendant volunteer his services for such period of time as the court may designate to remove litter from the highway. Any such sums collected shall be paid into the court and forwarded to the State Treasurer for the construction and maintenance of state highways.

Section 1X.2-11 Punishment for conviction of misdemeanor

(a) For Class I Misdemeanors, confinement in jail for not more than 12 months and a fine of not more than twenty-five hundred dollars, either or both.

Role Cards

**I. (Ivan or Irene) M. Law,
Presiding Judge:**

You will ask the Commonwealth's attorney to begin by reading the charges against the defendant. Once the charges are read, you will ask the defendant to plead "guilty or not guilty." During the trial, you will keep order in the court and maintain a neutral appearance. No indication can be made of how you will decide the outcome of this case until all of the evidence is presented and the jury makes a decision. After the evidence is presented, you will outline to the jury what penalties can be assigned to a person found guilty.

I. (Irwin or Ivanna) B. Blue, Police Officer:

On the 10th of last month at 4:30 p.m., you were following a blue Toyota Tercel driving down Rt. 683. You observed the defendant throw something out of the car window. You pulled the car over and asked the driver to step out. When you asked about the incident, the defendant became defensive and stated "it was just an apple core; it really doesn't matter". Upon investigating the scene, you located the apple core on the roadside and made the appropriate notes. You followed all of the correct procedures when stopping the defendant and issuing a citation for littering.

D. (Daniel or Diana) Fence, Defense Attorney:

Your client was observed throwing an apple core from a car window. You are trying to call all of the passengers in the car to testify. You are hoping they can justify why your client should be found innocent or, at the least, receive a minimal penalty. The case against your client was observed by a police officer (I. B. Blue). All proper procedures were followed in stopping, arresting, and charging your client for littering.

Bailiff:

You will call the court to order and introduce Judge I. M. Law.

**U. (Ulysses or Ursa) B. Guilty,
Defendant:**

You are accused of throwing an apple core from your car window. You were observed doing this by Officer I. B. Blue. You are trying to talk yourself out of a large fine and possible jail time. Use whatever excuses you can imagine. Examples: I was trying to put it in the car trash bag and the wind blew it out of the window, my young nephew threw it out of the window, etc.

U. R. (Robert or Roberta) Mine, Commonwealth's Attorney:

You will present the case against the defendant and try to get the jury to find him or her guilty. Furthermore, you want the defendant (U. B. Guilty) to receive the maximum penalty. You will need to have the facts from the police officer (I. B. Blue) and your expert witness (Annie Moll or Noel Ital) so that you will be able to effectively question them.

Passenger:

You were in the car with U. (Ulysses or Ursa) B. Guilty. You witnessed that he/she threw the apple core out of the window. You are trying to help your friend make excuses to get off. Be inventive, but don't lie - perjury can get you jail time.

Juror:

You will listen to all of the evidence and vote whether you feel the defendant is guilty or innocent. If the jury finds the defendant guilty, a penalty will also need to be decided and recommended to the judge. Do not allow friendship to affect your decision in this important issue.

Television Reporter:

You must listen to all of the evidence and write a script that can be presented in 30 seconds on the local news. After the testimony is presented, you plan to interview all of the parties. Remember that your competitive stations are likely to also be covering the story and that ratings are everything. A good story may help you get a promotion to news anchor.

Annie Moll or Noel Itall, Expert Witness:

You were called by the Commonwealth's attorney. You will explain how discarding food along roadsides attracts animals to the area. If the apple core is actually on the road, then any animal living nearby that tries to eat it, is at risk for getting hit by a car. Remind the jury that in order for the animals to be in the area that the apple core was thrown, all habitat requirements for that animal must be met. In visiting the site, you noted that all habitat conditions were met for the following animals: mice, voles, raccoons, squirrels, and possums. Some of the predators that might feed on these animals are hawks and owls. One would expect to find these animals also in the area; so they, too, are at risk.

Newspaper Reporter:

You will listen to all of the evidence and write a front page story for tomorrow morning's paper. You are also trying to get a new job at a well known newspaper that pays double what you are making now. A good story will increase your chances of landing a new job. To do this, you will take very careful notes and include as much detail as possible in your story.

Tabloid Reporter:

U. B. Guilty is the most promising athlete in the state and is being recruited by at least 15 colleges. This story is of national interest, especially if he/she is found guilty and given jail time. You need to write a story that will tell it all. However, tabloid reporters are not allowed in court. No one can know who you are; besides, you don't want the competition to scoop you. Be as creative as possible, but don't actually lie. Exaggerations are completely acceptable.

It's a Wrap!

**Target Level:**

Grade K-12

SOLs:

Science: 2.1, 2.8

English: 2.2, 2.3, 2.8

Materials Needed:

Art supplies

Optional: relaxing tape of forest or stream environment sounds

Time Needed:

One class period

Optional: lunch period

Summary

Students develop creative ways to wrap presents using reusable or recyclable materials.

Objectives

Students will realize the amount of resources and money that go into wrapping paper and devise a way to wrap a gift using reusable or recyclable materials.

Background

"Americans throw away 25% more trash during the Thanksgiving to New Year's holiday period than any other time of year. The extra waste amounts to 25 million tons of garbage, or about 1 million extra tons per week." (www.cygnus-group.com)

A large portion of this extra waste is giftwrap. In today's society, wrapping is inexpensive and readily available, making it very easy to use it once and then throw it away.

However, there are many ways to reuse items to make attractive gift wrap, to use "gifts" as wraps or ways to make the gift so attractive that it doesn't need a wrapping. Some of the common examples are wrapping baby gifts in a receiving blanket, wrapping wedding gifts in a tablecloth, using the comics to wrap birthday and Christmas gifts, using a pillow case or cloth grocery bags as the wrapping and the list goes on. But what other ways are there to wrap gifts? Teens are very creative and imaginative and can come up with great ideas.

Preparation

If using the scenario cards, photocopy and laminate for durability and reuse and then cut apart.

Activity

1. Discuss an upcoming holiday or gift giving occasion, maybe someone's birthday, Christmas, Hanukkah, a wedding or other event. Ask about gifts that might be given and then discuss how the gift would be wrapped. Most students will say gift wrap or gift bags.
2. Discuss reusing wrapping paper or gift bags. Does your family do that? What are the advantages? The disadvantages?
3. Discuss alternatives to traditional gift wrap. What about other ways to wrap the gift? Have you ever received a gift that was wrapped in something other than paper giftwrap? What was the gift and the wrapping?
4. Break the students into groups of 3 or 4 and pass out the scenario cards. Give the students time to discuss the scenario and discuss the wrapping.
5. The next class period, allow the individual groups to wrap the gift. If time permits, have a sharing time, if not, use the next class period for students to share their ideas with others.

Scenarios for It's a Wrap:

	<p>Your sister has been living at home while attending college. Now that she has graduated and has her first job, she is moving into her first apartment in the city</p>	<p>Your aunt is expecting her first baby and you have bought the cutest little outfit for the new baby and a stuffed Pooh bear. Now, how do you wrap this gift without using wrapping paper or a gift bag?</p>
		<p>Your older brother is graduating from high school and plans on starting college in a few weeks. At school, he will be living in the dorm. You need to decide on a gift and how to wrap it creatively.</p>
		<p>It is your friend's birthday and you have bought her a sweater. You know that your friend is into the environment and has said that she would never use wrapping paper again. How will you wrap her gift?</p>

What's Your Recipe?



Target Level:

1st and 2nd Grades

SOLs:

Science: 1.1, 1.3, 1.8(indirect), 2.1

Materials Needed:

Large cutting board

Masking tape

Crayon

Commercial cleanser

Spray bottle

Small bathroom cups

Salt

Baking soda

Measuring spoon or scoop of some type (an old baby formula scoop or a scoop from a powered drink mix is perfect for this activity, the important part is that they are the same size)

Time Needed:

15 - 20 minutes preparation

45 - 50 minutes

Summary

Using the scientific method, students will develop and test a combination of baking soda and salt and then compare its ability to that of a commercial cleanser.

Objectives

Students understand that the natural cleaning products are just as effective as today's more chemically based cleaning products.

Background

Our stores are filled with a variety of cleaning agents, some of these use "environmentally friendly" ingredients and some of these use ingredients that are toxic. All of them clean well. However, our great-grandparents made cleansers that worked just as well, used less packaging, less production time and impacted the environment less. In this activity, students will compare how effective one of these cleansers is against a currently available cleanser. From a pollution prevention point of view, your best choice is to purchase only one cleaning product - generating only one set of packaging waste. And if it is a product that is packaged in recyclable or reusable material, it is an even better choice.

Advanced Preparation

Using the masking tape, divide the cutting board into 10 to 12 sections. Using a crayon, make two to three stripes in each section.

Procedure

1. Break the class into 5 or 6 groups of 3 or more children in each group.
2. Hold up the container of commercial cleanser and ask the children if any of their parents use it at home. Explain that today they will be trying a mixture of things to see if they can make a cleanser that will clean as well as the cleanser you have chosen.
3. Show them the boxes of baking soda and salt. Explain that these are the ingredients and that they need to make a mixture that contains some of both. They can use one scoop of each or two scoops of one and one scoop of the other, or any combination that they would like. (Note to teachers: It is important to remind the students to use a full scoop leveled off at the top.)
4. Explain that in an experiment there are some things that change and some things that remain the same. In order to be able to tell what caused the difference in the results in an experiment, only one thing can be changed at a time. In this experiment the things that will stay the same are the cleaning surface (cutting board), the substance that needs to be cleaned (same color crayon), the amount of water (sprays from spray bottle), the item used to clean (sponge) and the time allowed to clean. The thing that will change is the composition of the cleanser. Also have the students choose if everyone will rub soft or rub hard while trying to clean.
5. Allow the students to come up and test on one of the sections of the cutting board to see if they want to keep the same formula or change it. Once all of the groups are satisfied with the quality of their cleanser, they will record the number of scoops of baking soda and salt on a sheet of paper along with the names of the group members. Have the students write a prediction stating if they think their cleanser or the commercial cleanser will clean better. Then conduct the actual experiment.

6. The groups will select one person to do the scrubbing and that person will come up and use the cleanser on a clean sponge and be given a set time (usually 30 seconds) to clean their section. Once all of the groups have gone, you will “judge” which cleaner worked the best and which ratio was the most effective cleanser in this case.

7. Ask the students how they might change their ratio of salt to baking soda if they were to repeat the experiment.

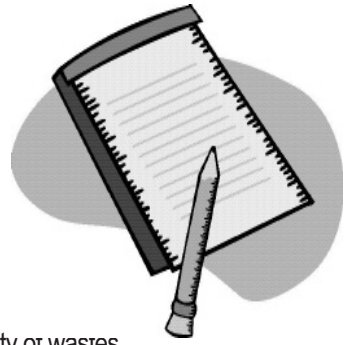
Wrap Up/Assessment

Discuss where they might use this type of cleanser at home. What type surfaces do they think it will clean? What type of messes might it clean?

Follow-Up

Have students use excess mixture to clean their desks.

Pollution Prevention Audit



Target Level:
K-6

SOLs:
Science: K.10, 1.8, 2.8, 3.11,
4.8, 6.11

Materials Needed:
Copy(s) of the P2 Assessment for
Our School form

Time Needed:
One class period

Summary

Students will participate in an investigation of wastes produced in a school environment and suggest ways to decrease them through an audit process.

Objectives

Students will be able to identify and reasonably quantify a variety of wastes found in a school setting, determine where and how the wastes are generated and their origins as raw materials, target “problem” waste flows, and consider pollution prevention (P2) or waste reduction solutions.

Background

Pollution prevention is a way that manufacturing facilities can reduce wastes by maximizing raw material use and minimizing the leftovers. You may not think of schools as producing much pollution, but they also have room for improvement in waste reduction and energy conservation. One simple example is found in the volume of paper that is used and disposed of in a school. Other examples of materials and energy students and teachers use everyday are also important to consider. Here are some suggestions for schools to conserve energy and prevent pollution:

- Use energy efficient lights and heat, and turn them off when not needed.
- Install high-pressure/low-volume water faucets and shower-heads.
- Use hot-air hand dryers instead of paper towels.
- Install low-volume toilets.
- Replace cleaners with less toxic alternatives.
- Provide recycling bins for aluminum, glass, plastic, and paper.
- Save paper by using 2-sided copying, and reuse mistakes as scrap or draft paper.

The term “audit” refers to a way to “account” for the flow or use of raw materials in a given facility. A pollution prevention auditor develops an inventory of waste-producing activities and characterizes the use of the raw materials. By quantifying wastes and figuring out why they are generated, the P2 auditor can identify problem areas and suggest ideas for reducing them.

Inventory + Asking Questions + Brainstorming + Research = P2 Solutions

Procedure

1. Schools can start preventing pollution by taking an inventory of the places and activities which may be creating waste. Here are some suggestions of where to look:

PLACES	MORE PLACES	ACTIVITIES
Cafeteria Green House Offices Gymnasium Locker Rooms Vending Machines Copy Rooms	Laundry Room Shop Outdoor Areas/ Playground Bathrooms Student Areas Classrooms Parking Lots	Heating Air Conditioning Water Use Landscaping Housekeeping Cleaning Lighting Energy Use Construction

2. Ask students whether they think P2 measures are already being used.
3. Invite possible pollution prevention solutions.

Wrap Up/Assessment

As a group, or individually, have students name a particular Place or Activity and fill out the following chart. This will also help in their making the connection between the raw materials *being used* and the waste *being generated*.

Extension

This activity could easily lend itself to presentation materials and opportunity to share with other classes, the principal, PTA, or local school board.

Pollution Prevention Assessment for Our School

Student Names: _____

PLACE or ACTIVITY: _____

Types of waste found: _____

Quantity: _____

Why are wastes produced? _____

Types of raw materials used: _____

Quantity: _____

Disposal costs/Raw materials: _____

Solid Waste: \$ _____

Hazardous Waste: \$ _____

Wasted Raw Materials: \$ _____

Types of energy efficient fixtures and appliances: _____

Are any P2 measures already being used? _____

P2 ideas? _____

Ms. Virginia's Cookie Factory



Target Level:
K-6

SOLs:
Science: 4.8, 6.11

Materials Needed:
(based on a class of 30)
6 rolling pins
6 sets of 2 or 3 cookie cutters
OR 6 play-doh fun factories
6 plastic bags or peices of wax
paper, or easel paper (or
other surface to roll play-doh)
6 cans of red, white and blue
play-doh (3 colors)
Optional:
6 plastic containers labeled “flam-
mable” or “hazardous” and
“handle with caution” lids
Newspaper for floor
Role cards (see copy page)
Ruler, markers and paper for
each team
Play money
Kitchen scale
Copy of “Recycling Rules”

Time Needed:
One class period

Summary

In this activity, students plan how to use resources to “manufacture” cookies and discover ways to manage their raw materials and reduce wastes.

Objectives

1. Students understand that manufacturing processes use natural resources to produce a product.
2. Students understand that manufacturing products also produces wastes, and in many cases, wastes can be reduced to help prevent pollution.
3. Students learn that wastes produced by industry are handled differently and are not just “thrown away” -- they can be recycled, reprocessed, or disposed of using environmentally-approved methods to prevent pollution.

Background

Industries use natural resources to manufacture goods. Different kinds of wastes are generated as a by-product of manufacturing. All industries attempt to reduce waste in order to increase profits and to reduce the amount of waste produced. Any waste produced costs money, in both lost resources and in cost for disposal. Preventing waste prevents pollution and makes good economic sense for business.

Roles

Customer: The leader (teacher) becomes the customer after play-doh machines (or cookies cutters and rolling pins) are handed out and instructions are explained. An alternative could be to invite a parent or other adult in to be the customer.

The customer’s role is to place orders, create pressure, demand quality and generally harass the teams with the goal of creating an atmosphere of good-natured competition chaos. The customer circulates to each team and places his order with the “big boss”. Orders can be for cookies, CDs, computer parts, or any “product” the students will relate to. After the teams have begun working, the customer begins requesting samples from each team and inspects their quality. While inspecting each team’s product, the customer mentions how well their competition is performing. The customer inspects each team’s product, mentions the competition’s performance and how important the job is to their company.

Procedure

1. Divide the class into groups of 5 or 6. Give each group the play-doh, materials and role cards.
2. Have each group choose a name for their business (we suggest “cookies” as the product since it’s harder for students to label this industry as “bad”--other manufactured goods such as computer parts or CDs would also work). The students can design a logo and make a company sign for their work table.
3. Explain that the teams are in competition with each other to produce confections (or computer parts, etc.) desired by a customer. They must be made to exacting standards or the customer will not buy them.
4. Red play-doh is a raw material that can not be reused (dough you can roll only once)

or must be disposed of carefully (e.g. flammable or hazardous). Blue and white play-doh can be recycled under certain conditions (e.g. fed to animals). If the play-doh is mixed then the raw materials are contaminated and customer will not buy the product. Play-doh must be recycled according to “approved methods” listed in the recycling rules.

5. Any red play-doh cannot be recycled and you must pay to have it removed. Pure blue and white play-doh can be recycled and should be sorted and stored correctly; it is worth money to your company. Any blue or white play-doh that has been extruded or rolled out or otherwise worked with cannot be reused in the manufacturing process and must be recycled immediately. [Option: Blue or white could be specified as reusable in the manufacturing process to demonstrate the difference in waste generation.]

6. Give each group a few minutes to set up their equipment and supplies. Let them decide how to do this.

7. Give the teams the first order to make 10 blue stars (or other shape) with a length of 35 mm. The stars should be smooth on both sides and contain no mixed colors. The parts must be machine extruded, no hand molded stars allowed (unless you specify such).

8. When the first team is near completion, give the order to make 10 white stars with the same specifications.

9. When all teams have started on this order, have the customer decide that he/she needs an order of 3 red ropes 100 cm long before he/she needs the white stars. (Note: this change is designed to cause confusion and dismay among the teams as they must stop one task, change the play-doh, clean their equipment, and start another order.)

10. Once the teams have finished the red ropes, they can finish the white stars.

11. The customer will then inspect and “buy” all pieces that meet specifications once a team has finished all three orders. If some pieces do not meet the specifications, the team may work until the last team completes their third order. Once the last team has completed all the orders, all work must stop and all stations must be cleaned up. The teacher or other adult may now play the part of the recycling company and “buy” the uncontaminated, non-toxic materials at a specified price per gram (\$0.50/gram). Contaminated play-doh (mixed or red) must be hauled off by a waste management company. The factory pays to have it removed. (\$10.00/gram).

Wrap Up

Ask the students what teams produced the least wasted play-doh and analyze why this might be the case. Ask students to predict ways they could organize the materials or change the process to get better results. How would employee training, new equipment, and/or new play-doh help?

Extension

Have the teams calculate their “bottom lines” and discuss how they can increase their profits and decrease the waste generated. Ask the “inspectors” for their recommendations. Which team generated the most and least waste? Discuss how communications can be improved and how roles and processes should change to facilitate pollution prevention.

Have the groups replay the activity with a “waste manager” on staff whose role is to remind other team members about contamination problems, correct storage and recycling methods. Other waste minimization ideas such as carefully estimating the amount of raw materials needed, can be employed.

Play-Doh Waste Management & Recycling Rules:

1. _____-colored play-doh is not recyclable; you must pay to have it removed.

Cost of removal: \$10/gram

2. _____ and _____-colored play-doh are recyclable and should be sorted and stored in plastic baggies. Any play-doh that has been rolled, extruded or otherwise worked with, can NOT be reused in the manufacturing process and must be recycled immediately. Recycling rebate: \$0.50/gram).

3. The teams generating the LEAST amount of waste (by weight) earns a bonus of \$200.00.

Reminder: If the final product (cookies) are multi-colored (the raw material of play-doh is mixed together) then they are contaminated and the parts will not be bought by the customer. These are high quality cookies you are making!

Manufacturing Specifications & Price List:

1. Extruded Triangles:

35 mm, consistent length, smooth ends

2. Extruded Ropes

100 cm long, consistent width and length, smooth ends

Customer Order Form

Quantity

Color

1. Extruded Triangles:

35 mm long @ \$10.00 each

2. Extruded Ropes:

10 cm long @ \$100.00 each

Balance Sheet:

Profit or Loss Statement for _____
(company name)

Beginning Balance:	+	
(money you started with)		

Costs (supplies you bought):

Start-up kit (2 cans of play-doh & cleaning tools) (\$300):	-	
Each extra can of play-doh (\$100):	-	
Extra cleaning tools (\$10):	-	

Subtotal:	
-----------	--

Gross Sales	+	
(amount of money you made)		

Recycling Rebate	+	
(\$0.50/gram received for used play-doh)		

Inventory	+	
(play-doh left over - not used - \$1.00/gram)		

Ending Balance:	\$	
(net worth)		

Divide class into small group of 5 or 6. Assign each person one of the following roles:

1. Big Boss: In charge of the whole team's operation. Receives information from customer and passes information to other team members through Quality Control and Production Managers only, does not talk directly with any other team member. You keep your back to the team most of the time and think everything is late. You only care about the finished product and usually forget about the paperwork.

2. Production Manager: You are responsible for all deadlines. You need to make sure that the team members are always working and the product is getting made. You check out progress every 2 to 3 minutes only and think that most of the technicians aren't working fast enough.

3. Quality Control: You're the only guardian of the company's good name. It is your responsibility to make sure the product is the best it can be. If the product is not good enough for you, then it is not good enough. You're afraid that the technicians are trying to slip inferior products pass you.

4. Technician (1 or 2 per team): You are the workers. You do what the production manager says and make sure that the product meets the approval of the quality control person. Only you understand how the equipment works. You think you are underpaid and overworked and don't like to be pushed around.

5. Technician's Assistant: You assist the technicians however they ask. You usually end up with all the dirty jobs.

6. DEQ Inspector: (Optional) You know that every facility has something to hide and your job is to find it. The paper work is never filled out right; their records are never where they're supposed to be, and all the labels are upside down. You observe the process and recommend how to generate less waste.

Note: The technician's assistant is only used when the class can not be divided evenly into groups of 5. Another alternative is to use groups of 4 or 5 students with one DEQ Inspector rotating among all the small groups.

It's Got to Come from Somewhere

Materials Needed:

4 chairs
Large bed sheet and clips
Household object word cards
Small natural resource cards
(7 each):
"Animal"
"Petroleum"
"Rock/Mineral"
"Plant" (1 set for each student)
4 large labeled boxes (1 per category)
"Where From?" Sheets
Pencils

Objectives:

To develop an awareness of the natural origins of a variety of modern products. To distinguish between renewable and non-renewable natural resources.

Procedure:

1. Set up a "machine" by draping a sheet over four chairs, clipping it securely and leaving a space to crawl through between the chairs. Inside the machine, place four boxes, labeled "Animal," "Petroleum," "Rock/Mineral," or "Plant"—depending upon the natural resource card that each is given. As they go through the machine, they should choose a household object card from the labeled box which corresponds to their natural resource card. They will then exit as a manufactured product.
2. Once out of the machine, the student should hold up his/her manufactured product for the rest of the class to see. The group should guess the natural resource origin of the object held up.
3. When all the students have taken their turns, ask them to group by natural resource.
4. Give each group a pencil and a "Where from" question sheet to fill out. Have each group share their answers with the rest of the class. Relate this activity to the law: "The Earth has limits."

Ask the students the following:

- Is your object from the earth?
- Is your object used one and then thrown away?
- Is your object biodegradable or non-biodegradable?
- Is the natural resource used to make your object a renewable or a non-renewable resource?

Household object words (color coded):

Animal	Plant	Rock/Mineral	Petroleum
Milk	Newspaper	Silver Fork	Acrylic Sweater
Leather Shoe	Paper Napkin	Soup Can	Plastic Fork
Natural Sponge	Paperback Book	Iron Frying Pan	Motor Oil
Sheepskin Mittens	Wooden Chair	Aluminum Lawn Chair	Toothbrush
Leather Belt	Cotton T-Shirt	Table Salt	Polyester Duffle Bag
Beef Steak	Potato Chips	Glass	Plastic Trash Can
Wool Sweater	Straw Broom	Ceramic Plate	Shower Curtain

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Who Polluted the River?

Science SOLs Addressed:

K.5, K.10, 1.8, 2.8, 3.6, 3.8, 3.9, 3.10, 3.11, 4.5, 4.8, 5.7, 6.5, 6.7, 6.9, LS.11, LS.12, ES.7, ES.9

Materials Needed:

1 clear container of water for every 10 – 15 students
1 labeled black plastic film canister per student
Canister ingredients (all are safe for students to handle)

Time Needed:

30 Minutes

Summary:

Using a model to represent the River, Bay or another local body of water, students participate in an interactive story dramatizing how, as populations increase and resource use changes, a water body becomes polluted. This graphic example demonstrates that we are all part of the pollution problem, and that we all must be a part of the solution. Students will discuss ways to conserve our valuable resources and how each of us can reduce pollution, trash and waste each day.

Objectives

1. List the principle pollutions in our nation's waterways and identify sources of pollution.
2. Draw connections between individual actions and results at the community level.
3. Discuss the positive actions that can be taken to help conserve resources and prevent pollution.
4. Realize that protecting the environment is not a one-time event, but requires ongoing changes in some daily habits.

CANISTER LABEL

Trees
Construction Site
Person Fishing
Farmers
Gardeners
Beach Party
Family Picnic
Barnyard
Washing the Car
Antifreeze
Mystery Liquid
Homeowner
Electricity Plant
Commuters
Motorboat

CANISTER INGREDIENT

Oregano or Parsley Flakes
Soil (dry clayish) or coca or cinnamon
Fishing line or dental floss
Baking Soda
Baking Soda
Assorted Litter (or candy sprinkles)
Assorted Litter (or candy sprinkles)
Cat Litter (or chocolate chips)
Soapy Water
Water with Blue-Green Kool-aid
Water and Soy Sauce
Water, Orange Kool-Aid and Toilet Paper/Tissues
Vinegar
Vinegar and Vegetable Oil
Vinegar and Vegetable Oil

Dry Ingredients: Fill canister halfway full with dry ingredients listed above.

Liquid Ingredients: Fill canister 2/3 full with liquid ingredients listed above.

Procedure:

1. Prepare and label the canisters as described in the materials section, enough for each student to have one canister. For each 15 students, fill one clear container with water nearly to the top.
2. Distribute one canister to each student. Instruct them to keep the canister closed and upright. The students should also be told not to reveal the identities of their canisters at this point.
3. Explain that you will tell a story about the river (water body) and that each one of them will play a part in the story. When they hear the name of the character listed on their canister in the story, they should open their canister, and empty its contents into the container (representing the water body).
4. Read the story on the next pages. Pause after each question to give students time to think and respond. After the story has been read, use the following questions for a follow up discussion.

Discussion Questions:

1. Who polluted the river or whatever water body you are describing?
2. What effect did the increasing population have on the water quality? (More people meant less wetlands and trees – which filter water, there were more vehicles, there was less open space, etc.)
3. Can you think of any ways that population increases have helped the bay? (Higher population densities led to more efficient use of resources, stronger environmental laws, public resources like sewage treatment plants, etc.)
4. Think about the pollution in your canister. Could something be done to prevent that type of pollutant from entering the water? How: (Go around the group and let each student address the pollutant in their canister.)
5. Challenge students to come up with ways to clean up the water in the container, after all, everything has to go somewhere. (Solids can be strained out. They may also find filters or absorbent cotton helpful.)
6. Once this type of pollution has entered the bay, how can we get it out? How can we clean up the river (bay)? Do they think it is easier to prevent pollution or to clean it up later? Have them explain their ideas.
7. What could each of us do to help improve the health of our bay (river) by preventing some of this pollution? (Possible answers include: biking or walking instead of driving, conserving water, picking up litter, pulling weeds instead of spraying them, install bat boxes to control insects instead of using insecticides, etc).

Who Polluted the River?

For many thousands of years, people have lived on the banks of the River. They hunted in the forests, harvested foods from wetlands, and caught fish from the river.

Imagine that a Native American took the container of water in front of you from the river 500 years ago. How does it look to you?

Would you drink this water? Would you eat the fish from this water? Would you swim in this water?

One of the first explorers to visit the river kept a journal of his discoveries. He wrote about the Native American Villages, the rivers and streams and the “sweet water”, and seeing so many fish that he and his crew tried to scoop them out with a frying pan.

Soon people began to arrive. They found fertile land for farming, forests full of wildlife, and a river that provided plenty of food. It was an outstanding environment for settlement, and the people prospered.

The river has changed a lot since it was first explored. This is a story of those changes. Listen for the name of the character printed on your canister. When you hear your character named, open the canister, and dump its contents into the river.

Years went by, and occasional storms drenched the area. High winds whipped through the **TREES** and blew leaves into the water. Gradually, towns started to grow along the banks of the river. Developers cleared wetlands and forests to build houses and businesses. Rains washed away loosened soil from **CONSTRUCTION SITES** into the river.

At first, towns were small. Upstream, **FARMERS** planted crops to feed the towns’ growing population. Some of those crops grew right up to the river, and **FERTILIZER** washed off the land and into the water. Other farmers keep pigs, cows, and other animals in their **BARNYARDS**. As rainwater drained out of the barnyard, it carried some of the manure into a little creek behind the farm. The creek flows to the river.

As the towns grew, more and more people began to move to the nearby countryside. These country homes are not connected to the city sewer system. Wastewater (elaborate on wastewater) from these homes flows into the septic tanks under the ground. One **HOMEOWNER** has not maintained the septic tank, and poorly treated sewage seeped into the river.

To meet the electricity needs of the towns; area officials decided that they would need to generate more power. To burn coal and produce power, an **ELECTRIC POWER PLANT** was built along the river. Gases coming out of the smokestacks combine with moisture in the air to form acids. The pollution falls back to the earth as acid rain or smog.

Traffic congestion can also be a problem for **COMMUTERS** and truck drivers who drive to and from work. Exhaust fumes, just like power plant emissions, can cause acid rain. If a vehicle is not kept in good repair, it might also leak oil or other fluids, which will wash off the pavement and into the river with the next rain.

And how do the residents of the town and surrounding areas spend their time? In one neighborhood, a lot of **GARDENERS** are out working in their yards. Some of them are using weed killer and insect spray to keep the lawns pretty. The next rain will wash some of

these into a little creek nearby and into the river.

One father is teaching his daughter how to change the **ANTIFREEZE** in the family truck. They pour out the used antifreeze into the driveway. Antifreeze is sweet tasting and can poison animals if they drink it. It can also get into the nearby creek and poison fish.

Nearby, a boy is **WASHING THE CAR**. The soapy water rushes down into the driveway into the storm drain; the storm drain empties into the river. The grease and grime on a car contains asphalt from the roads, asbestos from the brakes, rubber particles from the tires, toxic metals, and rust. If the boy had gone to the local car wash, the water would have been treated before it returned to the river.

Next door, a family is cleaning out their garage. They find an old rusty can with a tattered skull and crossbones label still stuck on it. What could it be? It looks dangerous, and they want to get rid of it before someone gets hurt. But how? Junior gets an idea: "Let's pour it down the drain by the curb!" So the **MYSTERY LIQUID** goes down the storm drain. The poison is out of site, but it is headed to the river.

On nice days, many people head down to the river. Some zoom all around in **MOTORBOATS** and don't notice that a little oil leaks into the water. A group of friends have spread blankets on the shore for a **BEACH PARTY**. Lots of families are **PICNICING** in the parks too. Some of these people have left trash on the shore. With the next storm, that trash will wash into the river. One the shore, a **PERSON FISHING** snags a hook on a log and breaks off they nylon fishing line.

Would you drink this water now?

Would you swim or boat in it?

Is it healthy for fish or other wildlife?

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